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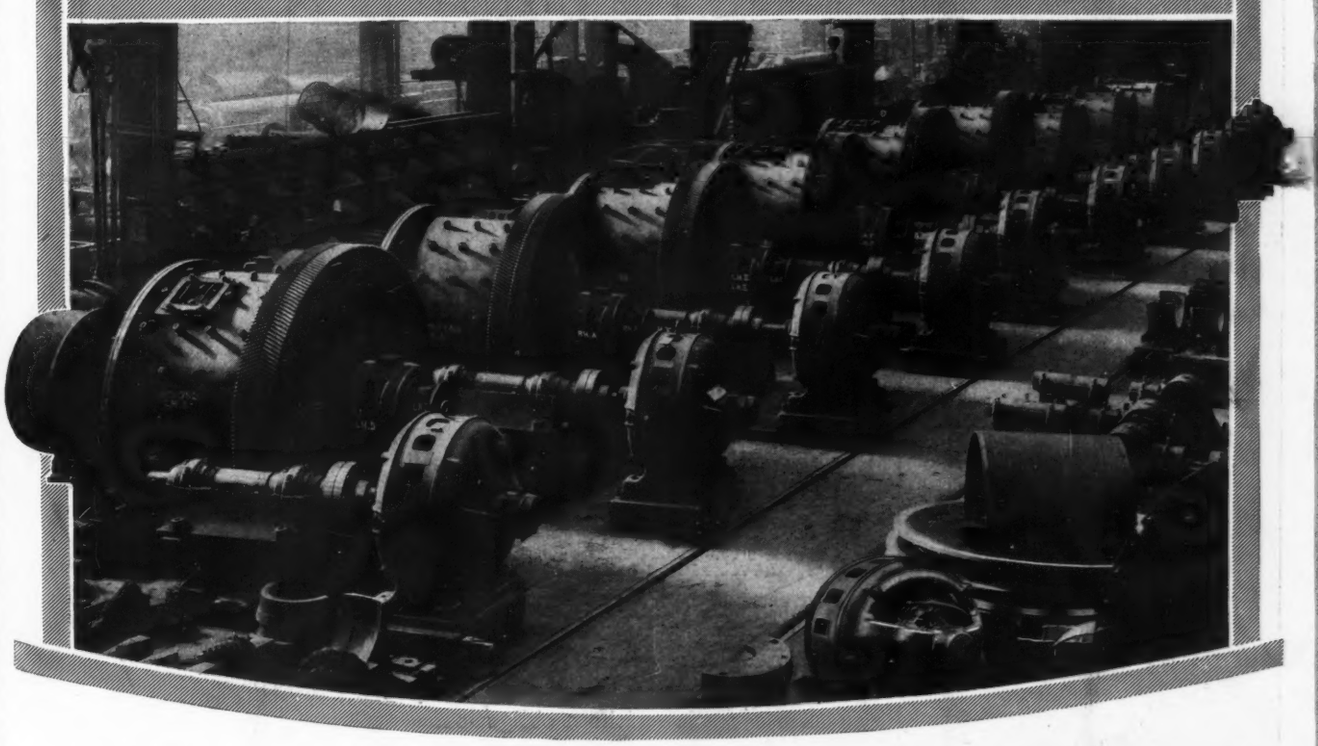

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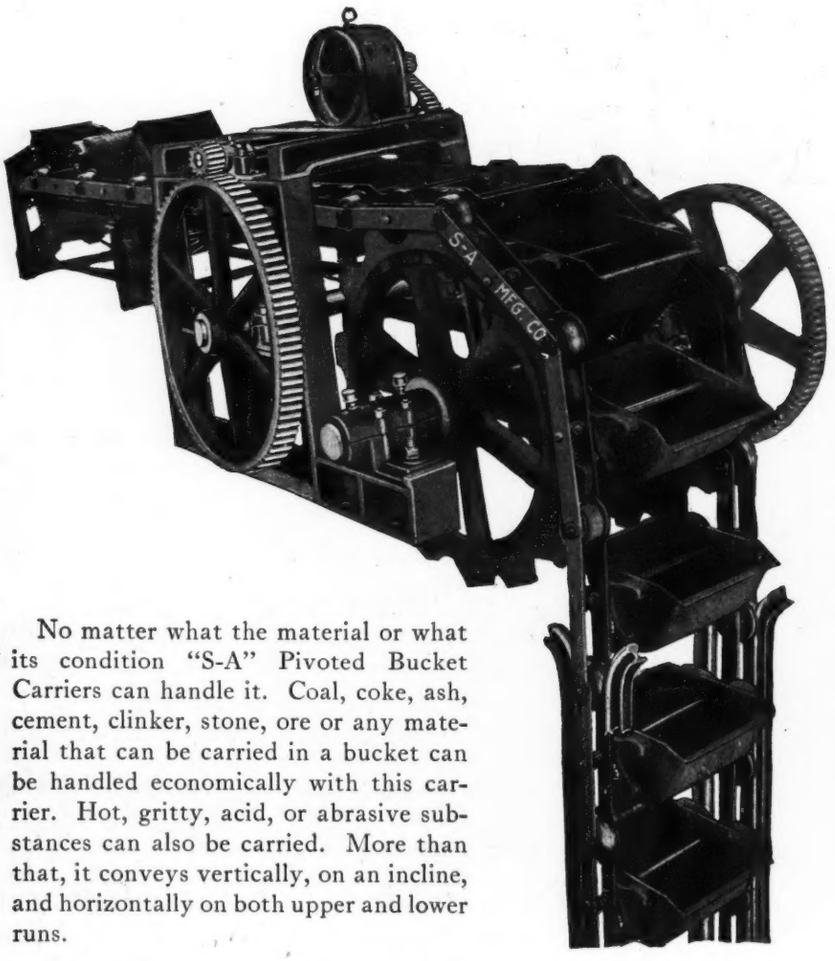

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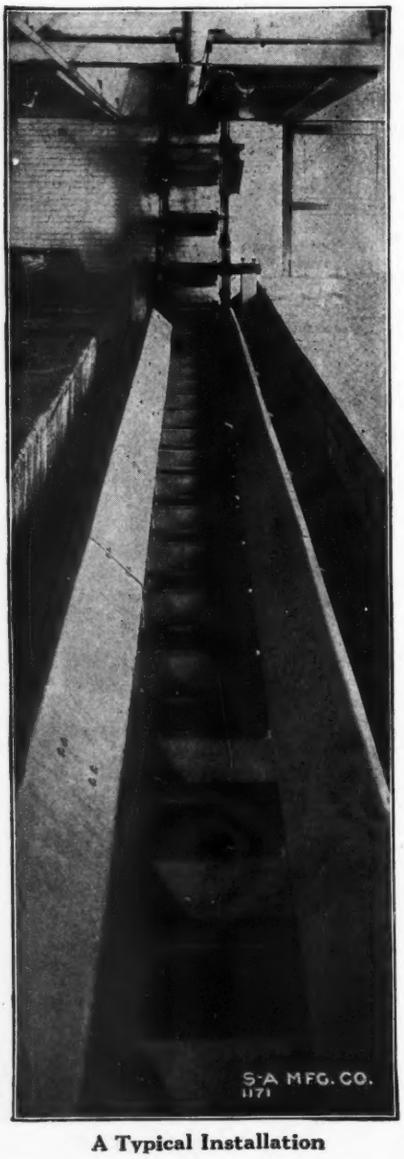

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Engineering and Mining Journal

February 8, 1919

Volume 107 *Number* 6

SMELTING PLANT AT NAMTU

Operations of the Burma Mines, Ltd.

By A. B. PARSONS*

An interesting description of Burmese life, traditions, and customs, and the operations of one of the most important mining properties in the East. As a future lead-silver-zinc producer, Burma Mines, Ltd., is likely to attract considerable attention. Extensive equipment is now in operation, and the property is the principal source of lead and silver for the needs of the Burmese government. There are large reserves of high-grade ore; and as profits since the inception of the company have been returned for reinvestment, its ultimate success on a large scale would seem as deserved as it is probable. Data with regard to mining operations in Asia are published infrequently, and the following paper will be read with more than passing interest.

WITH a well-authenticated record of having been worked intermittently since the fifteenth century, during which period they have yielded millions in fine silver to the Chinese, and with the prospect of being one of the world's premier lead-silver-zinc producers in the near future, the mineral properties of the Burma Mines, Ltd., present features of considerable interest. Operations center about Namtu, Northern Shan States, Upper Burma, where the smelting and power plants, mill, foundry, railroad shops, and general offices are situated. Namtu is about three days' journey inland by rail from Rangoon, one day beyond Mandalay, and only about 60 miles from the western frontier of China. It lies almost on the Tropic of Cancer, and is about the same distance from New York whether one travels via the Atlantic or by way of San Francisco and the Pacific.

To this geographical isolation and great distance from its base of supplies is added the further complication of a strange, uncultured population, having peculiar traditions and habits of life, and a country unsuited in its natural state to European habitation. It is difficult to comprehend the variety of problems that confront a company operating under such conditions—problems of which the average operator has no conception. Experience has shown that the more

*Mining engineer, Butte & Superior Mining Co., Butte, Montana.

nearly independent and self-contained a property is, the more smoothly will its operations proceed. To accomplish this end the company engages in a great number of activities, not directly connected with mining, but which tend to minimize, as much as possible, dependence on the outside world.

Despite the mine's isolation and the added difficulties of getting supplies of any kind, and particularly machinery, due to the war, the company is now supplying the Indian government with practically all the lead required for the manufacture of ammunition, together with much of the refined silver needed for coinage purposes.

Company Has Extensive and Varied Interests

The company owns and operates a 50-mile railroad, its own iron mine and limestone quarries, and, from about 50 square miles of forest adjacent to the railroad, it cuts sufficient fuel to operate the railroad and supply smeltery requirements, a total of about 7,000,000 cu.ft. annually. Approximately 10,000 natives are employed, supervised by a staff of about 100 "Europeans," a term which locally includes both Australians and Americans, the actual Europeans, in fact, forming a small minority. The direction of the enterprise, including the recent development and the plans for the future, has been in the hands of an American engineer, T. E. Mitchell, until recently resident manager for the company.

The mine itself is at Bawdwin, the northern terminus of the company railroad, about 13 miles above Namtu. There is a rise of nearly 1500 ft. in the journey from Namtu to the mines, and the trip up the canyon is remarkable for its exceptional scenic features. There are indications that the Chinese mined and smelted silver ores here even before the Christian era. If this is the case, the present Bawdwin—which, incidentally, means "silver well"—was, quite possibly, the scene of the world's first successful silver-smelting operations. At any rate there are authentic records at Mandalay which show productions prior to the year 1500. The details of Chinese metallurgy are not thoroughly understood, although there is ample proof that results were obtained.

Primitive Smelting Methods Used by Natives

The smelting was carried on in scores of small furnaces built of mud and sand, something after the fashion of a modern cupel test. The heat was derived from a charcoal fire on grate bars directly over the "test." After once getting a lake of molten lead, pulverized ore was sprinkled over the surface, small quantities at a time. During the interval between ore additions, a "slaggy" product containing about 60% lead, and mixed with bits of charcoal that had dropped through the grate bars, was skimmed from the surface. There was practically no silver in this skimmed mixture. After a quantity of ore sufficient to afford a convenient amount of silver had been treated, the remaining lead was taken off as an impure litharge, leaving the refined silver on the test. This completed a cycle of operations.

In mining the ore the mountain sides were gophered with hundreds of small adits, scarcely large enough for an ordinary white man to enter on his hands and knees. No indication of the use of explosives has been found, and the work was doubtless most tedious. That an almost countless number of coolies was engaged is indicated by the thousands of Chinese graves that dot the adjacent hillsides. The mines were finally abandoned by the Chinese in 1868, after a million tons of the best silver ore had been mined and treated. The jungle around Bawdwin was entirely cleared by these early-day operators, doubtless for fuel purposes, and the hills are still bare.

Lead in Ancient Slag Dumps First Attracted Attention

The first practical step toward the recovery of the immense quantities of lead in the slag dumps left by the Chinese was taken in 1904. In this year the Great Eastern Mining Co. began investigating the property, its interest being taken over, however, in March, 1906, by the Burma Mine, Railway and Smelting Co. Extensive sampling of the slag, with a conservative estimate of 115,000 tons available, appeared to warrant the construction of a smeltery at Mandalay, with a narrow-gage railway to connect Bawdwin with the Mandalay-Lashio branch of the Burma Railways.

The country to be traversed by this railroad was rugged and heavily wooded, so that the construction cost was high—and the cost of maintenance, owing to heavy grades, short curves, and tropical rains, has been still greater. However, the road was completed, and the furnaces were blown in at Mandalay in February, 1909. In two and a half years 40,000 tons of lead bullion was produced entirely from Bawdwin slag. In 1911 the smeltery equipment at Mandalay was moved to its present site, and the town of Namtu, where the narrow-gage railroad crosses the Namtu River, was started. This move was in anticipation of the ultimate exhaustion of the slag, which would make mining operations and a roasting plant essential. For the next few years the smeltery was run mainly on slag with a small proportion of ore, and a base bullion, carrying silver in quantity varying from 10 to 30 oz. per ton, was shipped away for refining.

At this time there were less than a dozen white men in this section of the country. There was considerable malaria in the wet season, and conditions were anything but suitable for Europeans. A. R. Oberlander and Edgar Malloy, both from the Murray plant of the American Smelting and Refining Co., were the leading spirits in conducting operations, and both are still at Namtu. Oberlander is personal assistant to the resident manager, and Malloy is smeltery superintendent.

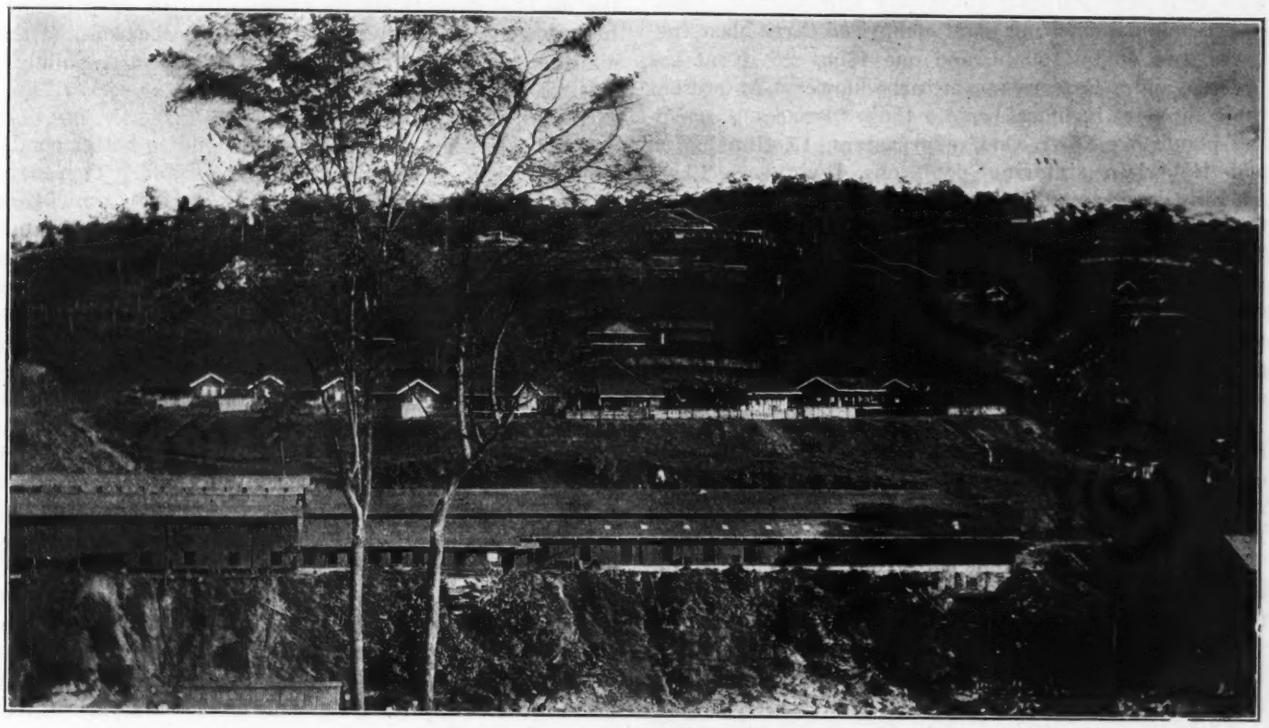
Strange Discoveries Made in Opening Old Working

During this period, development work at the mine was prosecuted in rather lethargic fashion, principally by enlarging, extending, and crosscutting from the "D. C." tunnel. "D. C." is an abbreviation for "Dead Chinaman," and has been used to denote this particular tunnel because of a number of human skeletons encountered when white men first explored it. One old section of the property is styled the "Jail Workings" in commemoration of the unearthing of a skeleton accoutered with manacles, presumably welded on during the life of the victim. Finally, what is now known as the Chinaman orebody was penetrated, and it soon gave promise of being a huge deposit. Vigorous development work, including an extensive campaign of

diamond drilling, gradually demonstrated the wonderful possibilities of the mine.

Briefly, these were the conditions in October, 1913, when a new company, styled The Burma Corporation, was organized, providing new capital with a view to developing an immense producing mining property. Four important things were to be done: (a) to put the mine in condition to produce tonnage; (b) to overhaul and add to the smeltery; (c) to discover and open available iron-ore deposits and limestone quarries, and (d) to make living conditions reasonably comfortable, and to minimize the danger from malaria.

The largest single piece of work undertaken was the driving of a main haulage and drainage tunnel 7400 ft. long to tap the workings 500 ft. below the D. C. tunnel level. It is really an adit 8 ft. by 10 ft. in the clear, double tracked and electric lighted, and soon to have motor transportation to replace the mules now used. Considering various difficulties and the amount of bad ground encountered, the work was accomplished in good time by native miners working under practical shift foremen from Butte, Mont. It was completed in September, 1916, and was ceremoniously named the Tiger Tunnel, by the Lieutenant-Governor of Burma.



EUROPEAN RESIDENCES AT NAMTU

The ore deposit is a replacement in a fine-grained, dark-colored silicified rhyolite, the impregnated zone being more than 100 ft. wide at certain points. The walls are not well defined, but in a general way the orebody approaches the vertical. The best ore, assaying as much as 50% lead, 25% zinc, and 50 oz. of silver, is found in the core of the deposit, the tenor diminishing as the limits on either side are approached.

The ore is an intimate and complex mixture of sulphides, with no uniformity in the proportions of lead and zinc, even in adjacent sections. This condition makes the mining of those classes of ore answering metallurgical requirements a particularly difficult matter. A fault at the south limits of the present workings cuts off the orebody, and to date its extension has not been discovered beyond this point. Along the strike the vein has been prospected and developed for about 2000 ft., and the northerly limit has not been reached, although there is a change in the ore, more or less copper being found at the north end. No effort has as yet been made toward proving ore below the Tiger Tunnel level, although there is no reason to question the downward extension of the orebody, with no diminution in the grade of material, there being no secondary enrichment.

The silver probably occurs as argentite in sub-microscopic mixture with galena, an interesting feature being the uniformity in finding approximately one ounce of silver for each per cent. of lead in all grades of ore, regardless of the amount of zinc. The following table gives a number of typical ore analyses:

ANALYSES SILVER-LEAD-ZINC ORE, BURMA MINES, LTD.

	Silver, Oz. per ton	Lead, Per Cent.	Zinc, Per Cent.
Silver-lead ore, No. 1	47.6	50.0	19.2
Silver-lead ore, No. 2	54.4	50.4	24.1
High-zinc ore, No. 1	11.0	11.2	38.8
High-zinc ore, No. 2	15.5	13.6	40.7
Zinc-lead ore	38.5	33.9	36.3
Second-grade ore	11.8	22.5	7.0

An idea of the immensity of the deposit may be had from considering a single block of 2,000,000 tons, 75% of which is pure sulphide.

Systems of Mining Used

At the outset square-setting was the only method of mining employed, but satisfactory results have recently been obtained in some places with a timberless rill system of stoping, and the applicability of other cheap methods is being determined. Timbers, of native wood cut in the vicinity, and squared at the company's sawmill, are used exclusively. The wood is hard and heavy, but is brittle, does not take weight well and is really

not satisfactory, being used only because it is the best available.

Ingersoll-Rand Jackhamers and B. C. 21 stopers are used for breaking ore in stopes, and do good work in the comparatively soft ground. The tunnel was driven with water Leyners, and these machines are still used in development work. Nobel's "Gelanite," 50% strength, is used exclusively for blasting operations. The present rate of production is about 300 tons, but so far as the physical condition of the mine itself is concerned, 2000 tons could be mined daily. This is the tonnage planned for the plants now under construction.

Details of Metallurgical Equipment

The original smelting plant comprised three blast furnaces, two 48 by 160 in. and one 48 by 96 in. at the tuyeres, and a Parsons steam turbo-blower. At present the equipment includes, besides these furnaces, a crushing plant, five 26-ft. Godfrey roasters, 19 Huntington and Heberlein sintering pots, one Dwight & Lloyd machine, and a complete refinery which turns out refined lead and a silver bullion of 997 minimum fineness. The installation includes dross furnaces, desilverizing kettles, Faber du Faur tilting furnaces for retorting, and cupels for silver refining, according to the standard practice of Parke's process. The refinery and the greater part of the roasting plant are comparatively recent additions.

The feature of the smelting operations is perhaps the high zinc content of the blast-furnace charge. Despite continued efforts to mine ore containing a minimum of zinc in proportion to lead, the slag regularly assays 16 and 17% zinc and has often been as high as 20%. The present roasting capacity is not sufficient for the elimination of sulphur to the desired extent, without too great a sacrifice in the tonnage put through the furnaces. Excessive sulphur, in addition to the "high" zinc, further complicates the problem of furnace operation, and three months is the maximum length of campaign before a furnace must be blown out, dismantled, and entirely cleaned out. In addition to the zinc, the slag analyses average approximately 14% lime, 24% silica, and 34% iron oxide. An inferior grade of coke comes from India. The ash averages 22% and the sulphur is high, though not so bad as Japanese coke in this particular. The latter was tried, but the Indian product was found to be preferable.

Iron-Ore Flux Obtainable Near By

The problem of obtaining adequate iron ore for fluxing purposes has been solved. The supply was almost exhausted some time ago, but recently new mines have been opened, and several years' supply is now available. The two principal sources at present are Thondaung and Mampwe, where a sufficient tonnage is minable with comparative facility. A desirable grade of limestone is obtained from various quarries conveniently situated on the company railroad, and a "gossan" ore, capping material at the mines, containing 60% silica and 5% lead, is shipped to the smeltery to supply silica in the charge. The matter of transportation is really the only problem in connection with the question of fluxing materials at this time.

The final and an important feature in the program for large-scale operations was that of waging war on malaria, and creating conditions suitable for European habitation. It was thought that the clearing of the jungle growth, and the draining of spots where water might accumulate, would go a long way toward eliminating the fever. The theory is that the zone of operation of the malarial mosquito is limited to a certain radius from its breeding place, and results seem to have verified that assumption. An area extending several hundred yards beyond the outlying bungalows has been cleared and drained, and to this action is largely attributed the reduction in the proportion of fever patients from something like 40% to less than 5%. A sanitary engineer, operating in conjunction with the medical department, is responsible for jungle clearing, as well as for sewage and garbage disposal and the maintenance of proper conditions as to water supply.

Living Conditions on the Property

Among the improvements which tend to better conditions generally a few may be enumerated. There are about 75 bungalows for Europeans, most of which are equipped with electric lights, bath rooms, screened front and back porches, and a kitchen in a separate building at the rear; a large mess house and modern dormitory for Europeans who have no families with them; a club house with piano, library, billiards, and other features; a similar club house at Bawdwin; and a provision store with a large assortment of high-grade "tinned" eatables. One is astonished at the things that can readily be obtained in a tin or a bottle. There is an ice plant and a plant for the bottling of distilled aërated water; and a bakery is being built. There are native bakeshops, but it is impossible to induce the bakers to adopt hygienic methods.

In addition to the accommodations enumerated, the company is preparing to go into the laundry business. The native "dhobe," or laundry man, uses a stone for a washboard, and when he has worn one smooth, he looks for a new one. He usually gets the clothes fairly clean, but it is a healthy garment indeed that can survive many trips to the "dhobe."

At the native town of Panghi, near by, a bazaar is held every fifth day, when fresh vegetables, fruits, and meat can be obtained cheaply. The company conducts a market where better meat can be purchased. Two Americans who own a farm a few miles from Namtu have a contract to supply beef. The natives make meat out of animals whose utility in transportation lines has been outlived, and it is atrocious stuff. A basket of very good vegetables can be obtained from Maymyo, a hill station and the summer capital of Burma, with an express charge of only 16c. Everything considered, living conditions are good and the cost is not excessive.

Native Labor Is Fickle and Unreliable

The methods of handling native labor have features characteristic of the Orient and are of some interest. In the dry season, extending from October till the following May, labor is plentiful, largely because of the influx of good coolies from China. During the rainy season, which covers the remainder of the year, many of these go back to their homes to raise rice, and there is continual difficulty, due not so much to numerical shortage as to the failure of those who are on the

payroll to come to work. The company is doing everything it can to improve living quarters and conditions, and thus induce the Chinese to stay the year around.

Wages are, of course, extremely low—and the value of the service rendered is correspondingly small. A coolie, as all common laborers are called, is paid the equivalent in Indian currency of from 24 to 40c. per day, the danger and disagreeable features of the work at which he is engaged being the principal controlling factors. Native "bosses" are numerous. They go under a variety of names and are paid 60 to 90c. Mechanics, or "fitters" as they are called, carpenters, masons, and native office men get about the same, that is from 60 to 90 cents.

The labor is admittedly but unavoidably inefficient. In the first place, a coolie never makes a move on his own initiative, and he cannot, apparently, attend to more than one thing at a time. A multiplicity of duties, no matter how trifling, confuses him, and he looks after nothing. The result is that it is generally necessary to have a great many more men than ought really to be used, particularly in plant operation. A coolie is absolutely irresponsible, and cannot be relied upon to come to work. As a sudden "touch of fever" is always an available and valid excuse, he cannot well be disciplined. This makes it necessary to carry an excessive number in a given department to insure against being short-handed about every third shift. A good "gaung," or coolie foreman, is sometimes a help, but he has little influence over his men.

The contract system is used on many kinds of work. Development driving at the mines, cutting fuel wood in the forests, bedding ores, breaking up sintered material at the smeltery, and various other work where a unit price can be figured, is done under contract. Masonry and framing timber are contracted also; and, incidentally, the carpenters as well as the masons are quite skilful at their work and are not as inefficient as the coolies.

Language Is as Varied as Costume

There are at least nine distinct languages in common use around the property, but the European who acquires Burmese, Shan, and Hindustani, with perhaps a little Chinese, can get along tolerably well. Though many of the natives know several languages, and are quick at picking up English, the great bulk of them know but one, and often cannot understand the other coolies they are working with. The confusion attending this Babelistic condition is equalled only by the variety of costume worn by the natives at work. The laws of country, tribe, and caste seem strictly to be adhered to, and the ideas gleaned from the pictures in one's school-days geography are substantiated in detail. Starting with practically nothing, and passing by devious stages up to the most voluminous, flowing robes—one finds them all. And what one would guess to be holiday regalia is nothing of the kind—simply a substitute for overalls and jumper. According to the inexorable decree of caste, a brick never must be laid except by a man wearing a full beard and sufficient drapery and flowing headgear for the adornment of a church bride. And it never is. A coolie invariably wears something on his head and also, invariably, nothing on his feet.

Plans for the company's future are concerned largely with metallurgical development. A concentrator of 2000 tons' daily capacity is under course of construction, and most of the machinery is either on hand or en route from the United States. The equipment includes rolls, tube mills, jigs, and tables in the crushing and concentrating departments; and extensive experimentation indicates that flotation will unquestionably play a prominent part in the scheme of concentration. The problem is, obviously, one of differential separation of the very fine and very intimately mixed sulphides of lead and zinc. However, no conclusion has been reached as to the most effective combination of processes, nor has the matter of flotation apparatus been determined thus far, although these questions are now engaging the entire attention of the mill staff.

Experimental work on a large scale has demonstrated the technical success of a treatment involving roasting, leaching, and electrical re-precipitation of the zinc. The deciding factor here will doubtless be the question of power, there being some uncertainty as to the possibility of obtaining sufficient at a cost low enough to make the process economically available. Field work with a view to discovering and making preliminary surveys of possible hydro-electric projects is under way. A number of good-sized rivers within a reasonable distance have been little explored by white men, and it is possible that a source of cheap power may be found.

Hydro-Electric Power Plant Proposed

Negotiations have already been consummated with the government of Burma for the utilization of the Mansam Falls, in the Namya River, on the Mandalay-Lashio branch of the Burma Railways. A transmission line 40 miles long will carry a dry-season minimum of about 3000 hp. The equipment is being purchased, and the installation will be pushed with all possible speed. Power for lighting, for the mine compressor plant, and for a few motors around the smeltery is now supplied by two 1000-hp. Diesel engine-generator units. The completion of the Mansam project will afford ample power for the mill, mine, and miscellaneous requirements, but some other source must necessarily be found to supply power for an electrolytic zinc plant. As an alternative, it is possible that a zinc plant may be built at tidewater, the neighborhood of Calcutta being under consideration as combining various advantages from different points of view.

Eventually a more modern lead smeltery may be built at Mandalay, or possibly in the vicinity of Rangoon. The supply of wood fuel will, according to present calculation, be inadequate after two or three years, and a move to bring the plant nearer to a coal supply may be made. The haulage of coke and flux complicates the by no means negligible traffic problems of the company's winding, narrow-gage railway, and this may be one of a number of factors which will decide the permanent site of the smelting works.

The exploration parties looking for water power are accompanied by geologists; and a general survey over a large area is being made. The stories of other old mines once worked by the Chinese, in circulation among the natives, are probably not without foundation in fact. At any rate, the country is very generally

"mineralized" and there seems every possibility of important discoveries being made.

Burma Mines, Ltd., is a British organization, being one of a number with which H. C. Hoover was connected in pre-war days. Hundreds of thousands of pounds have been invested, with profit up to date going back into the property, so that financial success is as deserved as it seems certain. A. F. Kuehn, of London, and Lawrence Addicks, of New York, are consulting engineers for the company. It is through the kindness of Mr. Kuehn and Mr. Mitchell, the late manager, that I am able to give these few details of mining and metallurgical operations in a remote corner of the world.

The Federal Trade Commission

Methods of the Federal Trade Commission in conducting its meat-packing inquiry were revealed at the hearing on Jan. 23 before the House Interstate Commerce Committee on legislation to regulate the meat industry in accordance with the commission's recommendations. Levy Mayer, counsel for Armour & Co., was on the stand discussing the constitutionality of the bill and the commission's inquiry.

"When the Federal Trade Commission took testimony and found a verdict of guilty against the packers, do you mean to say your clients were given no chance to reply?" asked Representative Sanders, of Louisiana.

"None whatever," Mr. Mayer said.

"You don't mean to say that when a witness took the stand to give damaging testimony against your clients you were not allowed to question him?"

"I was not allowed to participate in the hearing at all."

"You were not allowed even to establish the credibility of the witness?"

"No."

"Then what credence can we give to these findings?" continued Mr. Sanders.

"None whatever."

"Do you mean to say the Federal Trade Commission undertook to investigate a great industry without giving the industry a chance to present its side?"

"Absolutely none," Mr. Mayer said. "I made three trips to Washington to plead for the opportunity, but they refused and gave no reason. They sent scores and scores of examiners to go through the files of Armour & Co. and took many letters."

"Of course, they took all the letters to show the context?" Mr. Sanders interrupted.

"They did not," Mr. Mayer answered.

The witness said a mistaken inference drawn from one letter referring to an agreed price on lard compound was due to the failure of the commission to take other letters which would have explained that the price was fixed by the Food Administration and not by the packers.

"It is the most remarkable thing I ever heard of in my life," Mr. Sanders remarked, as he finished his questioning.

"If you can regulate private industry such as the packing plants, then you can regulate the manufacture of hairpins, rubber boots, everything," said Mr. Mayer, "and it won't be long before you have every dissatisfied element of the community appealing for the great panacea of Congressional legislation."

The licensing provision of the bill was declared the most drastic because it entrusted to one man, the President, the right to issue and revoke licenses. Mr. Mayer said the power given the Government to purchase and publish market newspapers staggered the imagination, and might lead to powerful political influence.

Engineers Represented in Washington

To provide for united action upon matters of common concern to engineers, the Engineering Council has recently organized a National Service Committee, and has established an office in the national capital. This action was based upon a tentative plan for representation of engineers at Washington, submitted to the Council at a special meeting on Nov. 21, 1918, by Philip N. Moore, of the American Institute of Mining Engineers. The present member societies of the Engineering Council are the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the United Engineering Society, and the American Society for Testing Materials.

The Engineering Council, through this National Service Committee and its Washington office, intends to accomplish the following general purposes, this committee acting always under the direction of the Council and within limitations fixed for it:

1. To indicate those public services which may best be performed by members of engineering societies, and, when desired, to offer the proper men for such services.

2. To speak authoritatively for the Engineering Council before committees of Congress and departments of the Government on all public questions of common interest to engineers, within such limitations as the Council may set from time to time.

3. To give promptly wide circulation among engineers to authentic information regarding pending legislation and executive actions which may affect the interests of engineers in any way.

4. To gather opinions of engineers on these matters.

The Engineering Council's aim is disinterested usefulness to the nation and the profession—not advocacy of any selfish ends—by giving unbiased information and counsel on technical matters, chiefly when asked. A modest start is being made. The work will be enlarged only as a real demand for the services of the committee develops.

The members of the National Service Committee have been chosen so as to represent different parts of the country. The appointees are the following: Chairman, M. O. Leighton, member A. S. C. E., Washington, D. C.; C. B. Burdick, member A. S. C. E., Chicago, Ill.; George F. Swain, member A. S. C. E., Boston, Mass.; Philip N. Moore, member A. I. M. E., St. Louis, Mo.; L. D. Ricketts, member A. I. M. E., Warren, Ariz.; Andrew M. Hunt, member A. S. M. E., San Francisco and New York; Andrew M. Lockett, member A. S. M. E., New Orleans, La.; W. C. L. Eglin, member A. I. E. E., Philadelphia, Penn.; Bancroft Gherardi, member A. I. E. E., New York.

The Washington office is at 502 McLachlen Building, 10th and G Streets.

The Smelting and Refining of Cobalt Silver Ore*

By SYDNEY B. WRIGHT

THE shipments received at the Deloro Reduction Co.'s works from the operators in the Cobalt and Gowganda districts consist of high- and low-grade silver-cobalt ore in lump form, jig and table concentrate, and ore residues such as those produced by the Nipissing Mining Co. and the Mining Corporation.

Sampling

For sampling purposes the ore is ball-milled to about a 20-mesh product, a 14% cut being drawn by a Snyder disk machine as the bulk sample. After a second Snyder cut, the sample, now constituting about 2% of the original ore, is transferred to the sampling floor, where, after thorough mixing, it is coned and quartered into two samples, which are then quartered separately.

Reserve samples of these original pulps are sealed and retained for umpire purposes, until settlement has been made for the shipment. The control samples are ground to pass a 100-mesh screen, scales being separated as usual for assay. The requisite number of assay samples is drawn for the shipper, smelter, and independent assayer, and the certificate of the last named governs in settlement for the shipment.

Metallics or nuggets are removed from the ball mill after the carload or lot has been crushed, and are melted down to base bullion in an oil-fired crucible furnace. The silver content, as shown by assay, is added to the total silver indicated as contained in the milled pulp, and settlement is made accordingly.

Smelting

After the ore is sampled, it is transferred to bins, from which it charged to the blast furnace. The charge is so calculated as to furnish a practically neutral slag, and, on account of the large quantity of fines present, the furnace is run generally at a blast pressure of only 6 to 8 oz. It was considered probable that by briquetting the fines the capacity of the furnace would be increased, but the test runs made on these lines did not produce the desired metallurgical results. The ore, and reverts from other sections of the plant, are therefore mixed wet and charged to the furnace in the form of a stiff mortar. This sinters fairly well before the smelting zone is reached, the actual flue dust produced amounting to about 6% of the ore and slimes charged. The products of the smelting operation are speiss, from which a quantity of base silver is liquated in the case of high-grade runs; slag, and arsenic fume, which is collected in baghouses of the regular type.

Desilverizing the Speiss

The speiss produced contains, approximately, Co, 22-25%; Ni, 16-18%; As, 25%; Fe, 18%; S, 7%; Cu, 1% and Ag, 1000 to 1200 oz. per ton.

This speiss product is ground in a ball mill until the whole passes a screen with 40 meshes to the inch. The ground material is then roasted until it contains only 10% of arsenic. The roasting is done in a furnace of the reverberatory type, which is equipped with a mechanical rabble having water-cooled arms. The chloridizing is done in a Bruckner cylinder.

The chloridized speiss is washed with water and then agitated for one hour with a cyanide solution containing the equivalent of 20 lb. KCN per ton. The silver is precipitated from the solutions by means of aluminum dust, one part of which deposits about eight parts of silver in Deloro company practice. It is interesting to note that the cyanide actually regenerated in this precipitation is practically equal to the theoretical quantity formerly present in the double silver salt. The precipitate now goes to the silver refinery, and the desilverized speiss residues go to the oxide plant.

Silver Refining

The base silver, liquated in the form of bottoms from pots of speiss, averages about 800 fine, the remainder consisting of arsenic and antimony, with some cobalt, nickel, iron, copper, and bismuth. This bullion is refined by melting it in an oil-fired Schwartz furnace, which is equipped as a small converter. As soon as the charge is in a molten state, the furnace is tilted backward into blowing position, and the metal is blown for about three hours. During the first half hour of this period the oil is shut off from the burner, the heat of the reaction being sufficient to keep the metal molten for that length of time. After a short further heating, the charge is poured into ingot molds.

The silver bullion thus obtained averages from 992 to 995 fine, and is brought up to commercial grade (996 and better) by remelting with silver precipitate from the cyanide plant. This operation is performed in a second Schwartz furnace. The gases from these furnaces are drawn through coolers and passed to a small baghouse. The fume is rich in silver, carrying about 800 oz. per ton, and consists essentially of arsenious oxide, with some antimony and bismuth oxides. All bullion slags and the fume are eventually re-charged to the blast furnace.

The gases from the blast furnace, the roasters, and chloridizers are drawn through flues and coolers before reaching the baghouses which collect the crude arsenious oxide. The temperature of the gases entering the baghouses is regulated at a maximum of 250° F. by means of a thermostat operating a damper in the main flue; when the temperature rises to 250° F., cool air is immediately drawn in.

Refining the Crude Arsenic

The crude arsenic that is collected in the baghouses is sent to refining furnaces, which are coke-fired reverberatory hearths. The arsenious oxide that is formed is volatilized and condensed in chambers that are emptied at intervals of 10 to 14 days. The products from these chambers are pulverized and packed in barrels by means

*Abstracted from *Trans.* Can. Min. Inst., 1918, p. 992.

of Raymond equipment. The clinker or slag drawn from the refining hearth contains all the silver that was formerly present in the crude arsenic. This slag goes back to the blast furnace.

Oxide Plant

It is necessary now to return to the desilverized speiss residues which contain the cobalt and nickel content of the ore. The metals in this material are present principally in the form of oxides, so that the first treatment is that of sulphatizing, to render the cobalt and nickel soluble as sulphates. The sulphatized speiss is charged to tanks, in which the mass is agitated with hot water, during which process the sulphates are dissolved. The liquors thus obtained are then freed from copper and iron before being passed to the precipitation tanks.

The cobalt and nickel are separated by fractional precipitation with hypochlorite solutions, the nickel being finally precipitated as hydroxide by means of milk of lime. The hydroxides of cobalt and nickel thus obtained are filter-pressed, washed, and dried, after which treatment the oxides are either pulverized and packed for the market, or are transferred to the metals department for reduction to the metallic state.

Metals Department

For the purpose of reduction, the oxides are mixed with charcoal and reduced to rough metal in oil-fired furnaces. After separation from excess carbon by means of a magnetic separator, the rough metal is melted in electric furnaces and converted into shot form by pouring into water.

The 50-kw. electric furnaces used are of the single-phase, top-and-bottom-electrode type, lined with magnesite, and have a capacity of 100 lb. of cobalt or nickel metal per hour.

Smelting Tin Ore in Mexico

By Bennett R. Bates

Tin ore occurs in small quantities at numerous places in Mexico and indeed is rather widely distributed, but to date no single important deposit has been found. The ore for the most part is stream tin, cleaned up in "bateas" by the natives from the gravels found in the steep precipitous gullies of the sierras, the very topography of which does not lend itself to single large deposits. Whether large or more important deposits occur down the streams has not, as yet, been determined. Such stream tin is found in the mountains near El Cubo, Guanajuato; and recently while the Tajo mill was being rehabilitated for the Cubo Mining and Milling Co. a small furnace was built, metallic tin was produced, and babbitt metal and solder were made on the ground.

The furnace shown herewith in operation, built by the natives, was similar to the early shaft furnaces used in Cornwall, and closely resembles that described by Agricola. The furnace proper consisted of a short vertical shaft about 6 in. square by 30 in. deep. Charcoal fuel was used, charging alternate layers of charcoal and ore. Both ore and fuel were wetted before charging, and the charge was frequently sprinkled to keep the top cool. Air was supplied from two hand bellows, the blast entering through tuyeres placed just above the floor of the furnace and directed downward and toward the tap hole, which was always kept open, the molten tin trickling in gushes.

Charcoal consumption was approximately 3 lb. to 1 lb. of ore treated. The recovery was about 67% metal. No assays were made, but from previous data at hand the product was assumed to assay 94 to 97% tin. The total cost of the resultant metal was 35 to 40c. (U. S. currency) per lb. By using standard formulas, excellent babbitt metal and solder were produced.

An endeavor was made to stimulate the ranchers to a greater production, in the hope of aiding in relieving the shortage of tin in Mexico City, but difficulty was

A MEXICAN TIN SMELTERY

experienced in supplying even the local Guanajuato district. Mexico City was able to find a considerable amount of tin in small lots here and there throughout the republic, which helped greatly to tide over the general tin shortage during 1917.

References to the smelting of tin in the manner described may be found in "Tin Mining and Smelting at Santa Barbara, Guanajuato, Mexico," by A. H. Bromly. *Trans.* A. I. M. E., Vol. 36, 1906, p. 227; and in "Metallurgy of Tin," by Henry Louis, p. 80.

Defective Mine Drills

By A. L. H. Street*

Plaintiff, as an employee engaged in operating a drill in defendant's mine, did not assume the risk of being injured through breaking of the drill because it had been welded, if the welding was defectively done and he was not apprised of that fact. This was one point decided by the U. S. Circuit Court of Appeals, Ninth Circuit, in the recent case of Bowden *vs.* Gold Hunter Mining and Smelting Co. (*252 Federal Reporter, 388*).

As a separate defense to liability for the accident, the defendant company also unsuccessfully relied upon a claim that the plaintiff had executed a release covering his injuries. The court held that, where an injured worker gives a release at a time when it is mutually supposed that the injuries are of minor character, the release will not hold good as against other and serious injuries afterward developed from the same cause.

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The Chilean Nitrate Industry During 1918

By DONALD F. IRVIN*

PERHAPS the most notable event in the second half of 1918 was the centralization of both purchase and sale of Chilean nitrate by the Allied governments and the Chilean government.

Since this arrangement has been in force the price has been stationary at 13s. for ordinary, and 13s. 6d. for refined, per Spanish quintal of 101.4 lb. Profit per quintal on this basis is more than normal, but it must be remembered that the present cost of production is, in many cases, higher than the pre-war selling price on the Pacific Coast. New construction work and the maintenance and repairs on all plants have been greatly curtailed during the war, so that the oficinas will doubtless have to make a large outlay in this respect as soon as freights and prices justify the work being started.

The nitrate needs of the Allies have been met by large-scale contracts, carried out by the joint purchasing board of the Allies, known as the "Nitrate of Soda Executive," through its agency in Chile, and the Chilean government, acting for the sellers. The purchase of 680,000 tons of nitrate to cover consumption for 1918 was a remarkable transaction.

Future Conditions Uncertain

At the present date—the end of November—there is much anxiety as to what will be the amount and price which the Allies will decide upon for their 1919 purchases. Conflicting forecasts are common, and vary in character from the pessimism which claims that "Allied purchases in 1919 will be practically nil, due to unused stocks in the munition plants, and large available sources of supply from the synthetic nitrate plants in Europe and the United States," up to the simple faith which was recently exhibited by a member of the Chilean Senate who averred that he "felt no alarm for the financial prospects of his country, as its fate was lodged securely in the care of the Almighty."

Since hostilities have ceased in Europe the nitrate producers are busily trying to orient themselves, but reliable landmarks are hard to establish. A grave situation in the matter of sea freights may occur through the resolution announced from Washington by the Shipping Board, since the signing of the armistice, to the effect that all vessels are to be withdrawn from the South American trade routes and kept in transatlantic service until sometime next spring.

Formation of a Technical Society in Chile

An interesting and promising step is the recent formation of a scientific and technical society to encourage improvements in technique, and to provide, by means of regular meetings and the publication of a bulletin, for an exchange of views and data on nitrate mining and treatment and to serve, likewise, as an official spokesman for the industry.

This body, known as "El Instituto Cientifico e Industrial del Salitre," was founded by a number of Chilean and English nitrate operators, of well-known business and professional standing, and already has received government recognition. One of its first steps should be to provide authoritative figures for the cost of the most important artificial nitrate substances, per unit of nitrogen, laid down in the business centers of the world.

Alejandro Bertrand, the eminent Chilean chemical engineer, who was until recently the representative of the Chilean government in connection with nitrate promotion and investigation in Europe, is a member of this body, and has already issued valuable articles, containing authentic data from original sources, on matters concerning artificial nitrate manufacture in Europe. These articles have appeared in the publications of the "Asociación Salitrera de Propaganda."

The exchange value of the Chilean peso began to drop rapidly in September, falling from an equivalent to about 34c. U. S. currency, in July, to about 22½c. in November. This, of course, had an immediate effect on the economic life of the country.

German Influence Counteracted When Chilean Prosperity Is Threatened

In June, Germans and German sympathizers in Chile caused an acute though short-lived situation in the nitrate business resulting from an attempt to paralyze activity by legal action in the Chilean courts at a time when the results would have caused the greatest danger to the Allies. Various German firms (owners of oficinas) sued to recover from certain English firms a large amount of fuel oil due them on pre-war contracts drawn up in Chile. This oil was obtained by the English importers from American oil companies, and was shipped from either Californian ports or from Tampico, Mexico.

The English companies did not deliver this oil to the Germans, because of the "Trading With the Enemy Act"; and the amount due per contract but undelivered to the Germans had reached about 16,000 tons at the time of the lawsuit.

In default of the oil, the Germans obtained an injunction on the sale or delivery of this to any other persons until they were given what they claimed. In the meantime, one of the two large oil storage tanks, owned by the English company in Iquique, burned to the ground. The remaining tank was of relatively small size.

The Germans could not get the oil from the English, nor, had they been able to do so, did they have enough storage room for such a quantity at their oficinas. It was also impossible for them to market without Allied permission any nitrate they might produce. The English, according to the injunction, could not make any other disposition of the oil, and without the necessary fuel oil the local railway and the nitrate plants which are served by it in the Iquique district were on the verge of a disastrous shutdown.

At this stage the American oil producers allowed it to be known that, unless the injunction was immediately removed, no more American oil would be shipped to Chile. The effect was magical. The Chilean government set aside the court action, and no further trouble was experienced. Local fuel supply in Chile, as in other South American countries, is scarce and of poor quality,

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so that there is an almost complete dependence on foreign fuel. American and Mexican oil wells supply the bulk of the requirements, especially so far as the nitrate industry is concerned. A stoppage of fuel imports into Chile would have caused a crisis in the nitrate industry and a general financial panic in the rest of the country—a condition that the Chilean government did not dare to risk.

Nitrate Production Responds to Stimulation

The statistical situation of the nitrate business may be summarized as follows, according to the data of the "Asociación Salitrera de Propaganda":

EXPORTATION OF SODIUM NITRATE FROM CHILE

	Tons of 2000 lb.
June, 1916, to July, 1917	3,156,051
June, 1917, to July, 1918	3,210,596

At the present writing there are 140 oficinas at work, including several that have just been completed. Their tonnage of caliche handled daily varies from 250 or 300 to 2500 tons. A common capacity is about 750 to 1000 tons.

Abnormal conditions continue in the vicinity of the German-owned oficinas. The plants are, in most cases, given over to caretakers, and all work is stopped. There is a persistent rumor that the largest nitrate-producing organization—the Cia. de Salitres de Antofagasta—is negotiating for the purchase of the most valuable part of the German oficina holdings, situated in the district of Toco. The oficina Augusta Victoria, in the Boquete district, was said to count the ex-Kaiser of Germany as a heavy stockholder.

Dismantling and Reërection of Oficinas

Recent construction among oficinas has been limited, though several idle plants were dismantled and reërected on new ground in other districts. One interesting example of this is the case of oficina Ghyzela, in the Taltal district, which was dismantled and transported by rail, about 350 miles, to Tarapacá and reerected as oficina Santa Laura. The same company has built oficina Brac, in Tarapaca, and Lina, in Antofagasta. It is interesting to note that the latter two are both owned by Jugo-Slavs. Oficina Christina, in Aguas Blancas, is a new plant just starting up; and the Du Pont Nitrate Co. began work in December at its new plant at oficina Peña Grande, in Tarapacá, from which a large production is expected, as it will work on a rich deposit.

Penyon Syndicate Acquired Considerable Interests

Steps have been taken recently to renew operations on a large scale in Aguas Blancas, at the Penyon property, which has been the field of activity of a New York group. In 1916 and 1917 a considerable amount of examination work was carried out on this property. Huntington Adams, of New York and Antofagasta, has acted as the local representative of the syndicate interested in the purchase of the ground.

The development of treatment methods continued during the year in various forms at several localities, but in most cases was confined to endeavors to improve the means of handling slime, or to undertake production of nitrate of potash from the mother liquors of the oficinas. At the Agua Santa property in Tarapacá, managed by J. T. Humberstone, the Butters filter which was installed in 1915 is still in operation, handling a slime pulp. W. R. Grace & Co., at the company's oficina Paposo, have put in a Burt filter, to handle a mixed pulp of coarser material than that usually recognized as a filter slime. Oficina Peregrina, in Toco, now has a Butters filter in operation, the construction of which was begun about two years ago.

The Cia. de Salitres de Antofagasta is now putting into service an Oliver filter to handle slime derived from the regular boiling treatment; and at oficina Celia, in Antofagasta, the Gibbs process plant has been at work since December, 1917, using weak solutions in a scheme of treatment which involves Dorr equipment and an Oliver filter. The pregnant solutions are afterward evaporated in an economical type of evaporator (triple effect), and brought up to crystallizing strength. The liquors are then precipitated by cooling.

It is of interest to note that observations made by the designers of the Gibbs plant while inspecting the mechanical features of the salt works of Southern Michigan were of considerable help in the development of the final design of the evaporator they have adopted.

New Process Makes Higher Nitrate Recovery Than Shanks Process

After a year's work this plant has justified its design by an increased recovery of nitrate and a reduction in the consumption of fuel oil. I. B. Hobsbawn, and J. L. Grigioni, the technical advisers to Gibbs & Co., are responsible for the general design of the plant and the scheme of treatment, and W. H. Merriam is in direct charge of the operations.

At oficina Cristina an interesting departure in caliche leaching is being adopted which can be summarized as follows: The contact of the dissolving solution with the lumps of caliche is carried on by means of a dripping and trickling action only. The level of the liquid in the dissolving vessel never rises high enough to come in contact with or submerge any part of the caliche being treated. This is done so as to avoid the formation of slimes, which vigorous boiling, in the ordinary treatment, is bound to produce. The liquor which accumulates in the bottom of the dissolving vessel is afterward cooled, and the fine crystals of precipitated nitrate are dried and washed on an Oliver sand filter.

Oficina Delaware continues its work, employing similar equipment to that used in oficina Celia, mentioned above, and has found it profitable to make nitrate of potash, using a recuperative refrigerating process on the mother liquor from the daily treatment.

Apparatus Erected Is Often Impracticable

At various oficinas several other methods of treatment are being tested, or apparatus is actually erected, or idle, which varies from the not unreasonable to the ridiculous. High-speed centrifugals, for separating clayey slimes from pregnant solution (which were abandoned years ago in the metallurgy of gold and silver), still have devoted adherents in the nitrate fields. There is a motley collection of single-effect evaporators and specially designed vessels of peculiar form, intended to provide a high extraction and recovery, but often of futile character. The use of vibrating screens is generally increasing in an effort to make a clean separation of fine from coarse before starting leaching.

Mining methods have not changed much, though oficina Delaware has made a beginning by the use of a mechanical excavator (drag bucket) to remove loose overburden.

Bank-blasting, by means of the familiar electric blasting circuit and a grouped series of drill holes, has been successful at oficina Aurelia, where it was introduced by T. C. Peddar, as an innovation in caliche mining, which resulted in a decided reduction in cost of powder and also in labor. This method is naturally best adapted where the occurrence of the caliche permits the working of a long "face."

The drilling of the holes in some oficinas has been done by Jackhamers, driven by a portable compressor, in combination with a gasoline engine, mounted on a narrow-gage railway truck.

As a whole, prevailing treatment methods demand too close a sorting of the raw caliche to permit any form of mining which involves the breaking down and extracting of the material in mass, without regard to local variations of the caliche in tenor or physical character. Therefore economy may perhaps best be sought in modifying and cheapening the present methods of loading and haulage from the caliche beds to those oficinas that still use the older methods. The adoption of rational improvements in treatment is bound to permit a parallel advance in mining methods as well.

Gold and Platinum in Beach Sands

As a result of the unusual demand for platinum during the war period, and the decrease in supply, the United States was at one time confronted with a serious shortage of this metal, and the market price rose to four or five times the price in 1914. The Bureau of Mines therefore decided to investigate some of the more promising localities on the Pacific Coast where gold and platinum are known to be associated with such minerals as magnetite, chromite, and ilmenite, together with various siliceous minerals, the aggregate constituting what are commonly known as "black sands." The object was to determine whether any of these deposits are large enough, and contain sufficient gold and platinum, to be profitably exploited, and also to determine whether the base minerals present, especially the iron minerals, might be commercially utilized as a source of iron.

The investigation was entrusted to R. R. Hornor, metal-mining engineer of the Bureau of Mines, who proceeded to Marshfield, Coos County, Ore., and spent a month in the field of Coos, Curry, and Josephine counties, Ore., and Del Norte County, Calif. The results of the investigation are summarized in the statement that the deposits are disappointing both in regard to value and to quantity. They rarely contain enough gold and platinum, or occur in adequate quantity, to be exploited at a profit.

There are, it is true, a few favored places where small areas of the black sand show some precious-metal content, and these may become the site of small operations. The deposits in many places contain appreciable amounts of magnetite, chromite, and ilmenite, but these minerals are generally too scattered and too poor to constitute an important source of iron ore, especially in competition with the known deposits of magnetite on the Pacific Coast.

The first attempt at beach mining was in 1851 at Gold Bluff, Humboldt County, Calif., where gold was discovered associated with black and gray sands. This discovery was soon followed by others further north along the California and Oregon coasts. The period of greatest activity appears to have been from the beginning to the middle '70s, when the richest and most accessible of the old beaches were being worked. From that time until the present many futile attempts have been made to work both the present and the old beaches for the gold and platinum that they are supposed to contain. A few individuals, it is true, make a precarious living by working places along the coast where at certain times of the year the tide and storms effect a rough concentration of the sands; but wherever an attempt has been made to work the sands on a large scale, failure has invariably been the result of the operators' efforts.

Black-sand mining in the past has offered a fruitful field for unscrupulous promoters, and has been especially alluring to men having little knowledge of mining or mining methods. These swindlers usually claim to have wonderful machines or processes for extracting gold and platinum from the sands, and make the most extravagant claims for the processes or machines. Some of these process men were so bold as to claim that they could recover gold and platinum where the metals could not be detected by any scientific method. As a result, the Pacific Coast is strewn with the wrecks of many kinds of experimental machines and of plants that bear evidence to the credulity and childlike simplicity of those who had been induced to invest their money in schemes for treating the sands and in connection with which there was no hope of success.

Technical Paper 196, "Notes on the Black Sand Deposits of Southern Oregon and Northern California," has just been issued by the Bureau of Mines. Copies of this report may be obtained free of charge by addressing the Director of the Bureau of Mines, Washington, D. C.

Foreign Mineral Resources

The U. S. Geological Survey has just issued a circular letter calling the attention of engineers and others to the fact that it has recently been collecting information relative to the developed and undeveloped mineral resources of the world.

Owing to the large volume of material obtained, the nature of the records and the continual additions that are being made, publication is impracticable. In order to make these records available, George Otis Smith, the director of the Survey, has permitted files to remain open for the benefit of mining engineers and geologists who are studying the resources of and the conditions in any foreign country.

J. B. Umpleby is in charge, and may be consulted in regard to the material that is available. Some reports have been given to the Survey in confidence, and these, of course, cannot be made available to the public, but there is a large amount of useful data which may be consulted, and those interested in foreign enterprises, especially in little-known territory, would do well to consult with Mr. Umpleby as to what information is available.

Oxy-Acetylene Welding and Cutting*

OXY-ACETYLENE welding is the process of uniting metals through fusion, by means of exceedingly high heat concentrated in a gas flame, without having recourse to pressure or hammering. This gas flame is produced by the burning of an intimate mixture of oxygen and acetylene in an especially constructed torch. As distinguished from soldering or brazing, the oxy-acetylene process forms a welded joint with parts united in one homogeneous piece, material similar to that worked upon being used for furnishing additional metal where needed. In the case of a soldered or brazed joint, a metal is used as a binder, and this metal differs in composition and characteristics from the parts to be joined, which do not fuse in the process, as their point of fusion is below that of the binder. In forge welding, the heat applied is sufficient only to bring the parts to a plastic condition—not to a molten state, as in torch welding—and the joining is effected by hammering or compression.

An oxy-acetylene flame consists of two parts: a small inner luminous "cone," bluish-white in color, and a larger enveloping non-luminous flame. The temperature at the apex of the cone is the hottest produced by burning gases, estimated to be about 6300° Fahrenheit.

Superiority of Acetylene Gas

For welding work, the superiority of acetylene over other gases is due to its high carbon content and to the fact that it is endothermic, that is to say heat-absorbing, in its formation. Energy stored in formation is given off again in the form of heat by the acetylene upon dissociation. It is calculated that there are 1475 heat units produced by the combustion of 1 cu.ft. of the gas. Though theoretically two and one-half volumes of oxygen are needed to burn completely one volume of acetylene, the ratio in which the gases need be employed is one volume of oxygen to one volume of acetylene, the remainder of the necessary oxygen being taken up from the air. In actual practice this proportion of one to one is approximated, and the flame yielded by such a mixture is the correct flame—the so-called "neutral" flame. By increasing or diminishing the proportion of oxygen, flames known as "oxidizing" and as "reducing" may be obtained, the appearance of the cone changing as the proportions are modified.

Method of Generating Acetylene

Acetylene is produced by the reaction between calcium carbide and water in especially constructed generators of various types. As a matter of economy, the gas is usually generated upon the premises. It is, however, also obtainable in cylinders, in which case it is dissolved in acetone. This volatile liquid has the property of absorbing 24 times its own bulk of acetylene at normal temperature and pressure, and an equal quantity for each additional atmosphere of pressure applied. After purification and drying, the gas is forced into cylinders thoroughly filled with some porous material which has been previously saturated with acetone, and the pressure is increased to the point desired, generally to about 250 lb. per sq.in. at normal temperature. The use of dissolved acetylene is resorted to only where portability is a necessity, or else where the generation of gas on the premises is not warranted.

In the early days of the acetylene industry the gas was liquefied, but it was soon found that in this state it was unstable and likely to explode through jar or concussion when compressed to two atmospheres. Its use in this form was therefore abandoned. It is of interest to note in this connection that in England compressed acetylene may be used in tanks, provided they are filled with material of 80% porosity and of sufficiently fine mesh to prevent dissociation of the gas.

Electrolytic Process Used To Obtain Oxygen

Oxygen is generated either by the electrolytic process, which consists in dissociating the components of water, hydrogen and oxygen, by the passage of an electric current; or by the liquid-air process, which consists in liquefying air, and then separating oxygen from its component, nitrogen, by taking advantage of the difference in their respective boiling points. Though other methods of obtaining oxygen may be satisfactorily employed in localities remote from centers of supply, the two methods mentioned have the largest use by far, as they insure purity of product and economy of operation. Oxygen is placed on the market in seamless drawn-steel cylinders of from 100 to 250 cu.ft. capacity, compressed to a pressure of about 1800 lb. per sq.in. at 60° Fahrenheit.

The two gases are supplied at pressures much higher than are required for work, and, to insure a steady flow at any desired pressure, regulators are provided which reduce and control the pressure of each gas independently. Two gages are made use of for each gas, one showing the pressure of the gas in the cylinder or in the supply pipe, as the case may be, and the other the pressure at which the gas is being used in the torch.

Type of Apparatus

In apparatus of different makes the points of difference lie mainly in the varying construction of torches and generators, the principles guiding their use being practically the same. To meet different working conditions torches are made in various sizes and are provided with a number of interchangeable tips for producing flames of different size. The torches in use in this country may be subdivided into two general types:

Medium-pressure Torches—Those types which are designed to make use of acetylene supplied at about the same pressure as the oxygen.

Low-pressure Torches—Those types based on the injector principle, which use acetylene at a pressure of a few ounces and oxygen at a much higher pressure.

Acetylene generators may be subdivided into:

Pressure generators, delivering the gas at a pressure of more than 1 pound, and not to exceed 15 pounds.

Low-pressure generators, delivering the gas at a pressure of less than 1 pound.

Generators are also distinguished as carbide feed or water feed. Though there are various types of water-feed generators in Europe, generators in this country

*Abstracted from bulletin No. 11, issued by the Federal Board for Vocational Education.

are of the carbide-to-water type, in which carbide is dropped into the water. Modern generators of all types are automatic in their action, the carbide or water feed being regulated by the flow of gas, and are provided with a number of safety and "fool-proof" devices which render their operation and handling safe.

Factors Influencing Welding Operations Must Be Understood

In addition to a mastery of the fundamental principles of welding, in the application of the process it is essential that the characteristics of each metal concerned be well understood and always borne in mind. Careful consideration of expansion and contraction in all stages of the work, and of oxidation in its manifold aspects, depending on the metal under treatment, are vital fundamentals. The range of metals which can be successfully treated by the oxy-acetylene welding process is wide, including cast iron, wrought iron, steel, aluminum, copper, bronze, brass, lead, zinc, silver, and gold. Glass has likewise been successfully welded.

Cutting With the Oxy-Acetylene Flame

In addition to welding, the oxy-acetylene flame is adapted to cutting metals with accuracy and rapidity. Steel or wrought iron can be cut into any shape at a speed varying from 4 to 20 in. or more per min., depending on thickness, effecting a saving in time, labor, and cost as compared with other methods. The process is a chemical one. Steel heated to a certain temperature will actively combine with oxygen. This is demonstrated by the familiar experiment of burning a steel wire by dipping it, when red hot, into a jar of oxygen. The procedure consists in heating the object to be cut until it assumes a cherry-red color and then directing a strong jet of oxygen along the path of the desired cut, causing the metal to oxidize rapidly. The oxide or slag thus formed, which has a lower fusing point than that of the metal itself, runs off or is blown off, continually exposing fresh surfaces of the metal, which it pre-heats, to the oxygen and leaving behind a clean cut resembling the appearance of a cut made with a saw. It is important to note, however, that this behavior of the slag is confined only to the oxides of wrought iron and steel (cast iron cannot be cut, owing to its oxide having a higher fusing point than the metal proper), and therefore those are the only metals lending themselves to the cutting process.

As the rôle of acetylene in cutting is purely that of a heating agent, other gases may be employed in its stead. One of these is hydrogen, which is successfully used, and in heavier work is in some respects better than acetylene. The welding torch is not practicable for cutting purposes, and a specially constructed cutting torch is made use of, which differs from the former in that it is equipped with an additional outlet for supplying the oxygen needed for oxidation.

Automatic Welding and Cutting Machines

Automatic welding and cutting machines have been devised and are in successful operation which replace the skill of the welder on jobs calling for the continuous or repeated performance of a single operation. They have the advantage of manipulating the torch in an absolutely steady manner. The conception of welding machines dates back to about the time the welding torch came into use. Attention was first directed to their possibility by some manufacturers who, having to weld a series of identical objects, devised mechanical means for doing the work. Though the Europeans have been pioneers in this field and were the first to make pipe by this process, practically all of the machines in this country are of American design and construction.

There are at present various welding and cutting machines run by electricity at variable speeds which are used to turn out pipe at the rate of about a yard a minute; to weld barrels, transformer cases, radiator sections, and similar material; to cut holes in rails; to cut out circular shapes; to cut intricate forms out of sheet steel, one or more at one operation and on any desired scale; and for a variety of other work which, on account of its uniform character, does not call for the exercise of ingenuity or resourcefulness.

In cutting, the automatic machine has the advantage over the welder, through its absolute steadiness in manipulation, in that it executes a smooth, clean cut along the lines laid down in the design. A recent device is a cutting machine designed to be attached by means of magnets to steel surfaces, such as ship bulkheads. The cutting is done after the plates have been put in place, instead of the old way of cutting and then installing them.

British Gold Committee's Report

The report of the Gold Production Committee, appointed by the British Treasury, consisting of Lord Inchcape, chairman; Sir Thomas Elliott, Sir Charles Addis, and W. H. N. Goschen, has been published. In summary, the result of the inquiry elicits the following facts and opinions:

1. That taking the period of the war as a whole, the production of gold in the British Empire exceeded the production during the corresponding period immediately preceding it.

2. (a) A decline appears for the first time during the war in 1917. In 1917, as compared with 1916, there was a reduction in the value of gold produced in the Empire of £3,429,415, made up as follows, the figure for Australasia being an official estimate:

Transvaal	£1,183,141
Rhodesia, West Africa	484,677
Australasia	906,600
Canada	777,914
India	77,083
Total	£3,429,415

(b) In 1918 a further fall of £4,652,207, as compared with the 1917 production, is expected, made up as follows, the figures for Australasia and Canada being estimates not based on any ascertained figures, none being available in London:

Transvaal	£1,827,163
Rhodesia, West Africa	734,299
Australasia	1,401,400
Canada	674,586
India	14,759
Total	£4,652,207

(c) That the decline in the Transvaal in 1917 was due to a combination of shortage of explosives and shortage of labor, of which the shortage of explosives owing to the war was the more important, and in 1918

mainly to the shortage of labor not attributable to any large extent to the war.

(d) That the decline in Australasia in 1917 and 1918 was normal, and due in the main to natural causes, but that it was accelerated by the increase of costs and decrease in labor efficiency caused by the war.

3. That up to the date of the appointment of the committee, the treatment of low-grade ore in the Transvaal had not, to any extent which can be determined, been reduced by the war.

4. That from the point of view solely of gold production, the abandonment of the treatment of low-grade ore in favor of that of higher grade will not within any reasonable period reduce the total output of the Empire, and that the continuance of the working low-grade mines which are unable to operate at a profit to themselves is therefore not a matter of great importance to national interests.

5. The committee is not prepared to recommend any bounty or subsidy for the purpose of stimulating the gold output of the Empire. Gold is the standard of value. No more can properly be paid for it than its value in currency.

The Canada Copper Corporation, Ltd.

According to an interim report, dated Dec. 20, 1918, progress made in the construction, for the Canada Copper Corporation, of the concentrating mill at Allenby, British Columbia, situated 4.5 miles by rail south of Princeton, has been most gratifying. There is a reasonable promise that the plant will be under roof in the course of the next few weeks. Delivery of machinery has begun, and its installation will proceed forthwith. At present a force of about 160 men is employed on construction—all that is required for the work in hand. This force, however, will be added to as progress warrants. Foundations for the mill are practically complete; the machine shop, carpenter shop, and warehouse are in use. Coarse-ore bins of 3000 tons' capacity are completed. The construction of the main pumping plant at the river is proceeding, and the installation of the pipe line from this plant to the mill has been finished. The organization for the permanent operation of the plant is practically accomplished.

The completion, at the Copper Mount mine, of the two main haulageways on the 3945 level and on the 3170 level, respectively, has been previously reported. The principal heavy underground work at the mine which remained to be done was the driving of a main raise to serve as a means of connecting the upper workings and the tunnels. This work consisted of driving a zigzag ore-pass in six connecting sections, each at an angle of approximately 55°, the upper one being broken through to the 3945 level. Alongside this ore-pass a vertical shaft was raised, connecting the 3170 level with the surface, and to serve also as a means of distributing supplies and workmen to the different levels and to the surface, where the mine camp has been established. The vertical distance driven was 804 ft. This shaft is connected at intervals with the ore-pass to afford access thereto. All this work was completed since April, 1918, and there remains to be done only the permanent timbering and installation of the hoist, before operations begin. This hoist is on the ground.

In view of the fact that ample ore had been developed to supply the mill for many years, the mine was shut down in September, sufficient development work having been done to quickly place the mine in a position to supply tonnage to the mill on its completion. The mine camp is completely closed down. Certain surface improvements will be entered upon soon, such as the installation of further compressor equipment, which is on hand, and the erection of a limited amount of additional housing capacity, the material for which awaits construction.

Ore bins and a coarse-crushing plant will be built at the mouth of the main transportation level, from which the ore will flow into railroad cars. The excavation for this plant is completed, and the large jaw crusher and two large gyratory crushers are on hand. The earlier mining operation will probably consist principally of open-cast work.

As there did not appear to be any reason why further work should be at this time continued for the purpose of developing additional ore, the ore reserves remain as previously reported, namely, 10,000,000 tons assured and 2,000,000 tons probable, averaging 1.74% copper and 20c. per ton recoverable in gold and silver. The expectancy of developing considerable additional ore remains the same, and a substantial area is still to be prospected to confirm known possibilities.

No material changes have been made in the plans of the mill as previously outlined. Two units of 1000 tons each, of the 3000-ton mill, are actively in course of construction. Provision of living quarters is complete. The building program at the mill, including the erection of staff quarters, is complete, and need not be augmented until such time as the work of increasing the capacity of the mill is undertaken.

In the last report stockholders were advised that a contract had been entered into with the Kettle Valley Ry., a subsidiary of the Canadian Pacific, for the construction and operation of a railway to connect Princeton with the mill at Allenby and the mine at Copper Mount. Also, that an agreement had been reached with the Okanogan Power Co. whereby it was to construct and operate a transmission line to serve the company's operations. The railway is approximately 14 miles long, and the power-line extension from Greenwood 103 miles. Both of the companies named are engaged in this work, the grading for the railroad having been practically completed to a point approximately one mile beyond the mill. The bridge across the Similkameen River is nearly complete, and the laying of rails on that part of the road up to the mill has begun. The power company, having established several construction camps along the line, is engaged in clearing it. It advises that it has placed orders for copper and insulators. This line will be, in total length, 180 miles, making it one of the longest transmission lines on this continent. It is designed for 100,000 volts. The officers of both companies advise that they will be in a position to offer service when the mill is ready to operate.

The operation of the company's old properties and smeltery in the vicinity of Greenwood having been brought to a conclusion, the general office was moved from Greenwood to Allenby, and the previously existing headquarters at Greenwood have as a consequence been closed.

The Eight-Hour Day Defined*

This monograph is intended to clarify discussion of the eight-hour day. It is devoted to comparison and analysis of the different senses in which the term is used, and of the principles on which the demands for each type of a so-called eight-hour day are based. In particular, it aims to bring out the distinction between the "straight" eight-hour day as predicated on considerations of health or public policy, and the "basic" eight-hour day, which is largely a problem in wage adjustment. In presenting this analysis, there is no intention of expressing an opinion as to what constitutes the proper length of workday. This is a matter on which the National Industrial Conference Board is assembling evidence by major industries, for some of which it has already issued its findings, based on available evidence.

DISCUSSION of the eight-hour day is characterized by much vagueness and confusion because of the different senses in which the term is used. The phrase has no clearly defined or universally accepted significance. It has at least three separate meanings:

1. A straight eight-hour day under which overtime is eliminated or even prohibited, except in extraordinary emergency.

2. An eight-hour shift with three work periods daily of eight hours each for as many different sets of workers. This arrangement may extend over six or seven days of the week.

3. A basic eight-hour day in which eight hours is made the basis or measure for service or payment, but under which overtime is permitted.

These definitions reveal the distinctions which exist between the different meanings of the so-called eight-hour day. When the straight eight-hour day is meant, overtime is prohibited and the work-week contains 48 hours, or, if a Saturday half holiday is observed, only 44 hours. Under the eight-hour shift system, overtime is practically eliminated by the nature of the arrangement; if the industry operates continuously seven days in the week, the work-week totals 56 hours. In the case of the basic eight-hour day, the *nominal* work-week may consist of 48 or 44 hours, dependent upon the observance or non-observance of the Saturday half holiday, but, as overtime is permitted, no limit is imposed on the number of *actual* hours per week.

In discussing these distinctions it should be recognized at the outset that a "straight" eight-hour day with overtime prohibited differs from a "basic" eight-hour day with overtime permitted, not only in the number of work-hours but also in principle. This applies equally to consideration of the straight 48-hour week and the basic 48-hour week.

The Straight Eight-Hour Day

The eight-hour day in its rigid sense with prohibition of overtime is founded on the theory that such limitation of work-hours is demanded on grounds of health and social advantage. The contention is also often made that the straight eight-hour day is more productive than a longer workday. With these underlying premises for limitation of hours of work, overtime is inconsistent. Clearly, if the health of the worker or his social rights demand that he shall work not more than eight hours per day, permission of overtime labor, except in extraordinary emergency, is illogical. If the straight eight-hour day is really more productive than a longer workday, overtime is absurd.

The social grounds on which the eight-hour day is advocated do not permit of precise measurement. The factor of leisure is clearly not adapted to statistical evaluation. In regard to the health and wellbeing of workers, except for industries subject to peculiar health hazards or unusual physical or mental strain, only vague generalizations are available. The contention that a straight eight-hour day increases output lends itself better to the test of definite measurement, but clear distinction must be made between hourly output and total weekly output. In occupations where hours were previously unduly long, reduction has at times been followed by an increase in hourly output. But such an increase frequently does not mean an increase or even maintenance of total weekly output. Obviously, the economic result of the straight eight-hour day must be ascertained by measuring the total production achieved.

The straight eight-hour day has been brought about chiefly by legislation. It was first applied to women and children; later it was extended to men in certain hazardous occupations. Still later it was made applicable to employees on public works or contracts for the state, and last to certain private enterprises. At present an eight-hour day is established by law in many of the states to govern the hours of labor of men and women in public employment, or in private employment on contract work for national, state, or municipal governments. Fourteen states enforce the eight-hour day for miners. Eight states enforce it for men employed in smelting operations. Eleven states apply it to men in certain other private employments, most of which involve special hazards.

Federal legislation providing for an eight-hour day in certain Government contract work existed prior to 1892, but the provisions were vaguely worded, and their practical application was uncertain. By an act of Aug. 1, 1892, however, Congress definitely adopted the principle of a straight eight-hour day for laborers and mechanics employed by the Government or contractors or sub-contractors upon public works. The hours of work in such cases were definitely limited to eight in any calendar day, except in case of extraordinary emergency. A later act of June 19, 1912, commonly referred to as the Federal Eight-Hour Act, provided for the insertion in certain classes of Government contracts of a more specific condition. No laborer or mechanic was to be required or permitted to work upon the subject-matter of such contracts more than eight hours in any calendar day. A penalty of $6 a day for each mechanic or laborer illegally employed in excess of such hours was imposed. The eight-hour day enforced by this act was a straight eight-hour day.

The eight-hour shift system is in accord with the motive of the straight eight-hour day. Essentially, how-

*Abstracted from Research Report No. 11, issued by the National Industrial Conference Board.

ever, it is an arrangement for securing greater efficiency in production. It is quantitatively determined by the fact that, as the calendar day consists of 24 hours, the only practicable choice in a continuous industry lies between two shifts of twelve hours each or three shifts of eight hours each. In many occupations requiring continuous activity or high nervous tension, the twelve-hour shift has proved excessive; hence the system of three shifts of eight hours each has been adopted as the only alternative.

This system does not involve any organized overtime. Though its adoption may be based in part on the same grounds as are urged for the straight eight-hour day, it is a product of industrial organization and not of legislative enactment. Its effect upon output is radically different from that of the straight eight-hour day, and, as a wage measure, it differs from the basic eight-hour day. As against either of these arrangements, the eight-hour shift system obviously increases total production and lessens production cost by offsetting the burden of idle machinery and other overhead expense.

The Basic Eight-Hour Day

The basic eight-hour day, on the other hand, is essentially a wage issue. Eight hours of work are taken as a convenient standard by which to measure service, any hours in excess of these in a calendar day being paid for as overtime, usually at higher rates, but sometimes on a pro-rata basis. That the basic eight-hour day is primarily a matter of wages is clearly recognized in the Adamson law, which provides that "eight hours shall, in contracts for labor and service, be deemed a day's work and the measure or standard of a day's work *for the purpose of reckoning the compensation for services*[1] of all employees."

The phrase "for the purpose of reckoning compensation for services" obviously means that this legislation relates to wages, though the fact that overtime is permitted under it removes the act from the category of legislation primarily designed to protect the health or social welfare of workers. Its effect was similar to its intent. The railroads, faced with the alternative of changing their methods or paying for overtime, found the latter policy the cheaper, especially in their freight service. That this legislation is recognized as a matter of wages is shown by the report of the Eight-Hour Day Commission, appointed in pursuance of the Adamson law to report upon the operation of that statute, which states: "The same payment is now made for a minimum day of eight hours as was formerly made for a minimum day of ten hours. . . . The increase in pay which the observance of the law brings to the employee is chiefly in the form of payment for more hours of overtime at an increased rate per hour."

The practical effect of this legislation was to make overtime operative at the end of an eight-hour period without generally shortening hours of work. The wage previously paid for ten hours of daily service is now paid for eight hours, which means, of course, an increase in the hourly rate. This increased hourly rate, however, applies alike to regular and to overtime work; overtime is not penalized by extra rates.

The eight-hour day, whether straight or basic in character, implies as a corollary a certain length of work-week. The straight eight-hour day naturally leads to the 48-hour week, with eight hours of work for six days, and with overtime beyond 48 hours prohibited save in emergency. The practice of working only half a day on Saturday at times leads to a compensating lengthening of hours of work during the first five days of the week so as to offset the loss on Saturday. But where the Saturday half holiday is coupled with the straight eight-hour day for the first five days of the week, the work-week is automatically reduced to 44 hours. Where the Saturday half holiday is observed there is sometimes a sentiment in favor of entire cessation of work on that day, thereby creating a nominal 40-hour week. Thus, the straight eight-hour day in combination with the Saturday half holiday has a tendency toward a five-day week.

The basic eight-hour day implies a nominal 48-hour or 44-hour week, according to whether or not a Saturday half holiday is observed. But overtime is permitted and paid for at overtime rates if the work on any day extends beyond eight hours. In some cases overtime rates are paid for Saturday afternoon work.

In contrast with the basic eight-hour day, granting overtime rates every day for any overtime work on that day, even though no work or only partial work is done on subsequent days, the basic 48-hour week allows overtime rates only after a total of 48 hours has been worked during the week at regular rates. Thus, overtime may have been worked on one or more days, but if an equal amount of time has been taken off on other days, no extra allowance for overtime will be made at the end of the week. To prevent any day's work being unduly extended, overtime rates are sometimes made to apply to each specific day when overtime beyond a certain limit is required. Several decisions of the National War Labor Board contain this provision.

The basic 48-hour week differs sharply from the basic eight-hour day in principle. By requiring 48 hours of work before overtime rates are paid, it robs overtime largely of its premium advantage. For the same reason it lessens the incentive to the worker to take time off unnecessarily. In consequence, the basic 48-hour week tends to become less a measure for adjusting wages than one for securing efficiency.

Distinction Between the Straight and the Basic Eight-Hour Day

Clarity in discussion of the eight-hour day issue depends ultimately on recognition of the fundamental distinction between the straight and the basic eight-hour day. Recognition of this difference is equally essential to intelligent discussion of the work-week. Most aspects of the eight-hour shift system also admit of similar distinction.

In practice, the essential difference between the straight eight-hour day and the basic eight-hour day arises in connection with overtime. The straight eight-hour day under no circumstances encourages overtime, and, as enforced by legislation, prohibits it. The basic eight-hour day allows overtime, under penal rates which are intended to discourage it. Their practical effect, however, is to encourage what they are designed to prevent. In principle the straight eight-hour day is a matter of social policy based on regard for the health, welfare, and leisure of the workers. The basic eight-hour

[1] Not italicized in original.

day is a measure of service and reward. The former regulates hours of service; the latter is a form of wage agreement.

This essential difference is in a measure reflected in the methods by which limitation on work-hours has been brought about. Legislation has been the most general method for the introduction of the straight eight-hour day. Such legislation has usually been promoted by those who give weight to social considerations, whereas action by employers or by labor unions has generally favored the basic day. In any event, labor organizations have repeatedly opposed legislative limitation of hours of work, on the ground that such legislation would weaken their economic strength. Thus the American Federation of Labor, at its conventions in 1914 and 1915, defeated resolutions favoring the enforcement of a straight eight-hour day by law. The Adamson law for railroad employees, providing for a basic eight-hour day, was, on the other hand, forced by the demands of organized labor.

The basic eight-hour day with premium rates for overtime theoretically and practically violates the principle of the straight eight-hour day. The laborer who demands the eight-hour day on grounds of recreation, home life, and intellectual development, but who welcomes overtime, shows that to him the eight-hour day is in reality a question of earnings. To be consistent, advocates of the straight eight-hour day should oppose the basic eight-hour day. As matters stand at present the social need for recreation and home life is made the basis for a provision which, instead of shortening hours, merely increases wages. The straight eight-hour day thus becomes a fiction; the basic eight-hour day becomes an artificial means for demanding increased compensation.

Helium for Ballooning

Major-General Squier, Chief Signal Officer of the Army, told the American Institute of Electrical Engineers recently that one of the greatest scientific achievements of the present war from a technical standpoint is the production of helium in balloon quantities. This gas is non-inflammable and has about 92% of the buoyant effect of hydrogen. It first was obtained in minute quantities by Ramsay in England about 20 years ago by heating certain radioactive minerals, in which it occurs, because it is a disintegration product of radium. Its pre-war scarcity may be understood from the fact that, up to two years ago, not more than 100 cu.ft. ever had been obtained, and the usual selling price was about $1700 a cubic foot.

Notwithstanding so discouraging an outlook, some one in the British Admiralty had imagination enough to propose the large-scale separation of helium from certain natural gases in Canada that contain about one-third of 1% of it, and experiments were undertaken at the University of Toronto. Soon after the entry of the United States into the war, the Bureau of Mines, learning of the problem from a British confidential memorandum, persuaded the Signal Corps and the Bureau of Steam Engineering of the Navy to approve and finance jointly an experimental program on a large scale. Thanks partly to the unusually rich sources in this country, and partly to the skill of the two commercial companies whose services were enlisted and to the enthusiasm of the Bureau of Mines staff and Mr. Carter, of the Navy, who for a time represented the Army as well in the project, such success was achieved that at the cessation of hostilities there was compressed and on the dock ready for floating 147,000 cu.ft. of nearly pure helium, and plants were under construction to produce at least 50,000 cu.ft. a day at an estimated cost of not more than 10c. a cubic foot.

Mining Concessions Granted in Siam

The completion of the Siamese Southern Ry. extension has directed considerable attention to the mineral-bearing area traversed by this railway, according to Vice-Consul Hansen, at Bangkok, writing on Sept. 2, 1918. The Siamese Royal Department of Mines issued 80 mining leases during the last year, and it is reported that Australian, French, and Danish companies have secured valuable concessions. The total output of metallic tin during the year amounted to about 142,000 piculs (9,466 short tons), and 12,000 piculs (800 tons) of tungsten ore was also recovered. There was no activity in the mining of other metals during the year.

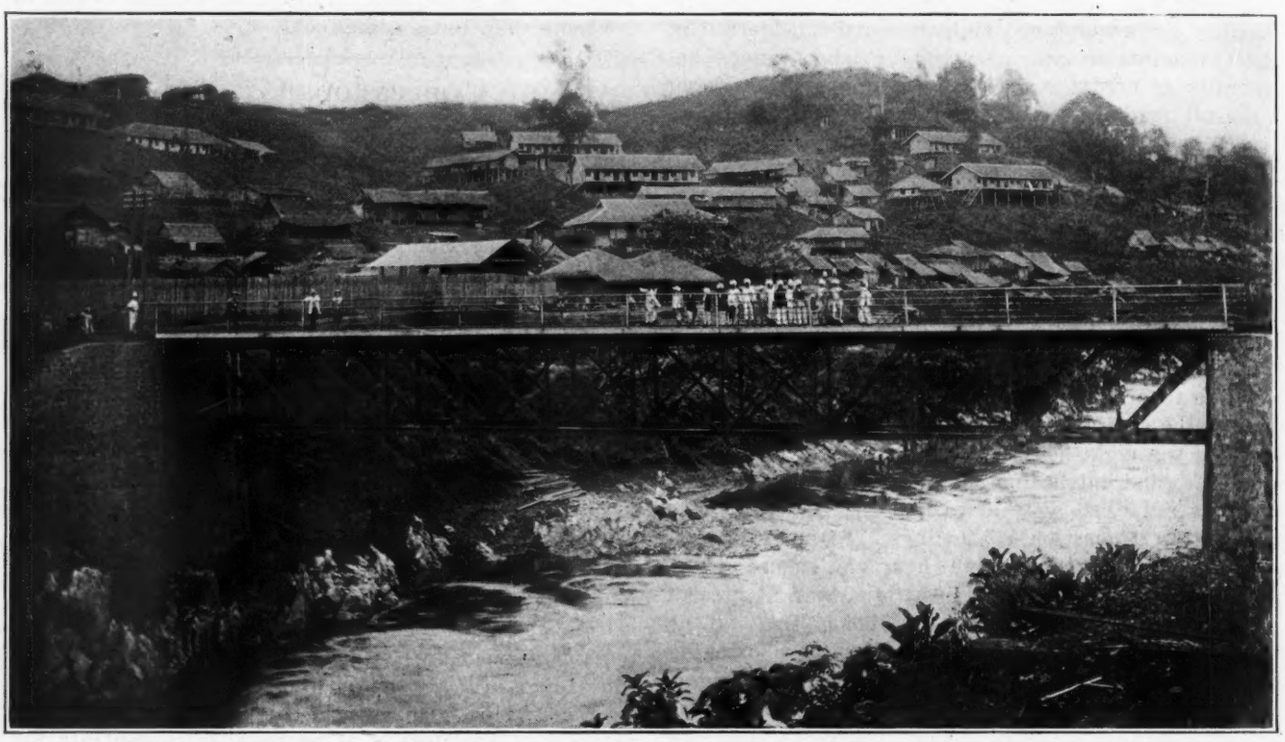
Antimony and Tungsten in Hunan

Hunan Providence produces about 95% of the antimony output of China, according to Consul N. T. Johnson at Changsha, the remaining 5% coming from the provinces of Kwangtung, Kwangsis, Yunnan, and Kweichow. The Hunan ores are the purest. They are reputed to be practically free from arsenic, carrying from 20 to 64% antimony. An effort is being made to concentrate the smelting of antimony ores in China near the place of production, and it is believed that with proper organization the country will be able to maintain its position as the world's foremost producer of antimony.

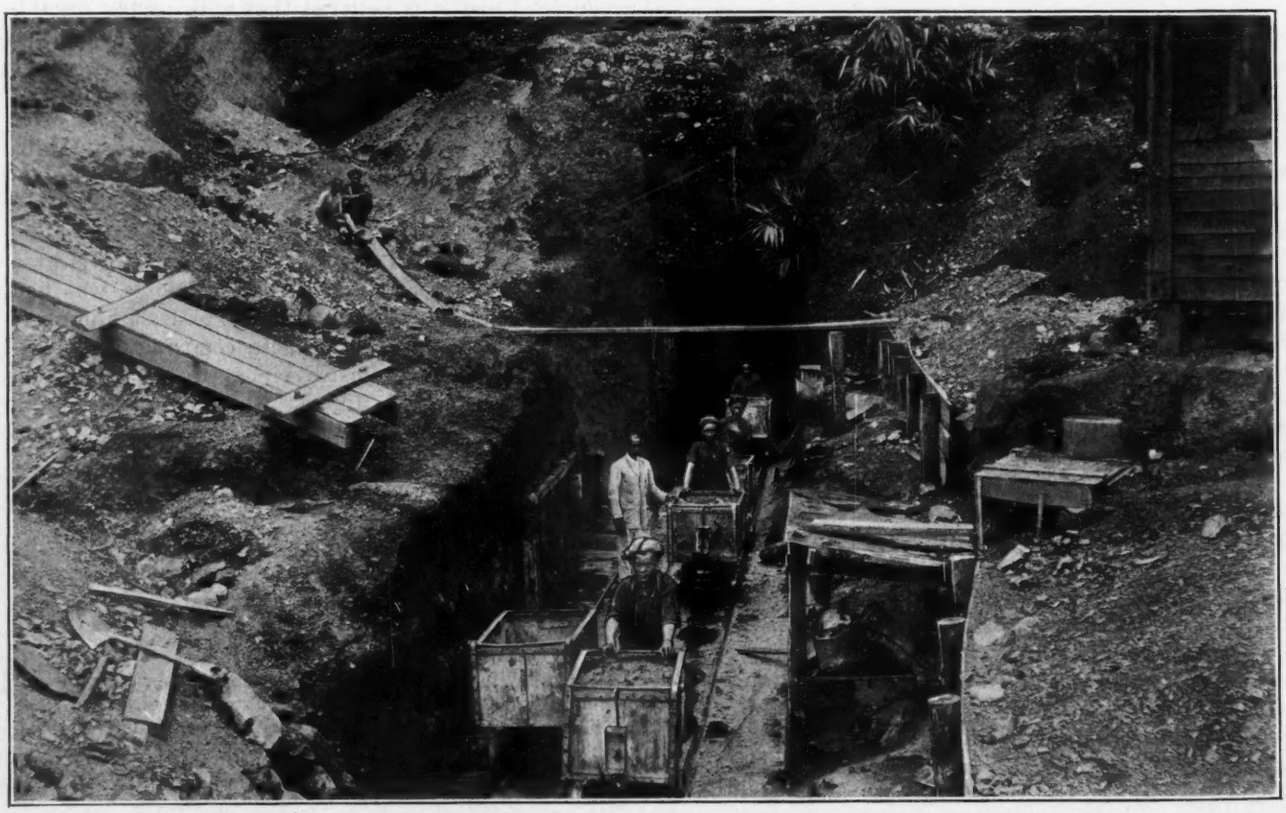
Deposits of wolframite occur in the southern part of Hunan Province not far from the boundary. The metal appears to occur in veins and outcrops among the hills in the district. The crumbled ore is found in the detritus at the foot of the hills and in the gravels of the streams. By reason of the high specific gravity of the ore, it is easily separated from the soil and gravel by a washing process known to the country people, who find it easy to collect the ore and peddle it to dealers in nearby towns. A number of Chinese companies have endeavored to secure exclusive rights to the extraction of this ore in southern Hunan. On account of the high price commanded by tungsten during 1917, a great effort was made by the Chinese to secure supplies for shipment, but development of the deposits was greatly hindered by the distance from transportation facilities, by disturbed conditions in the district in which the mines are situated, and by the active opposition on the part of the registered Chinese firms claiming monopoly rights to develop the mines in question.

Copper in Bulgaria.—For high prices for copper, Bulgaria commends itself to the most extravagant imagination. According to the Salonica correspondent of the London *Times*, a Bulgarian deserter reported that he had recently been sent to Nish to buy a small quantity of copper for the repair of regimental utensils, and had been obliged to pay about $13 per lb. for it.

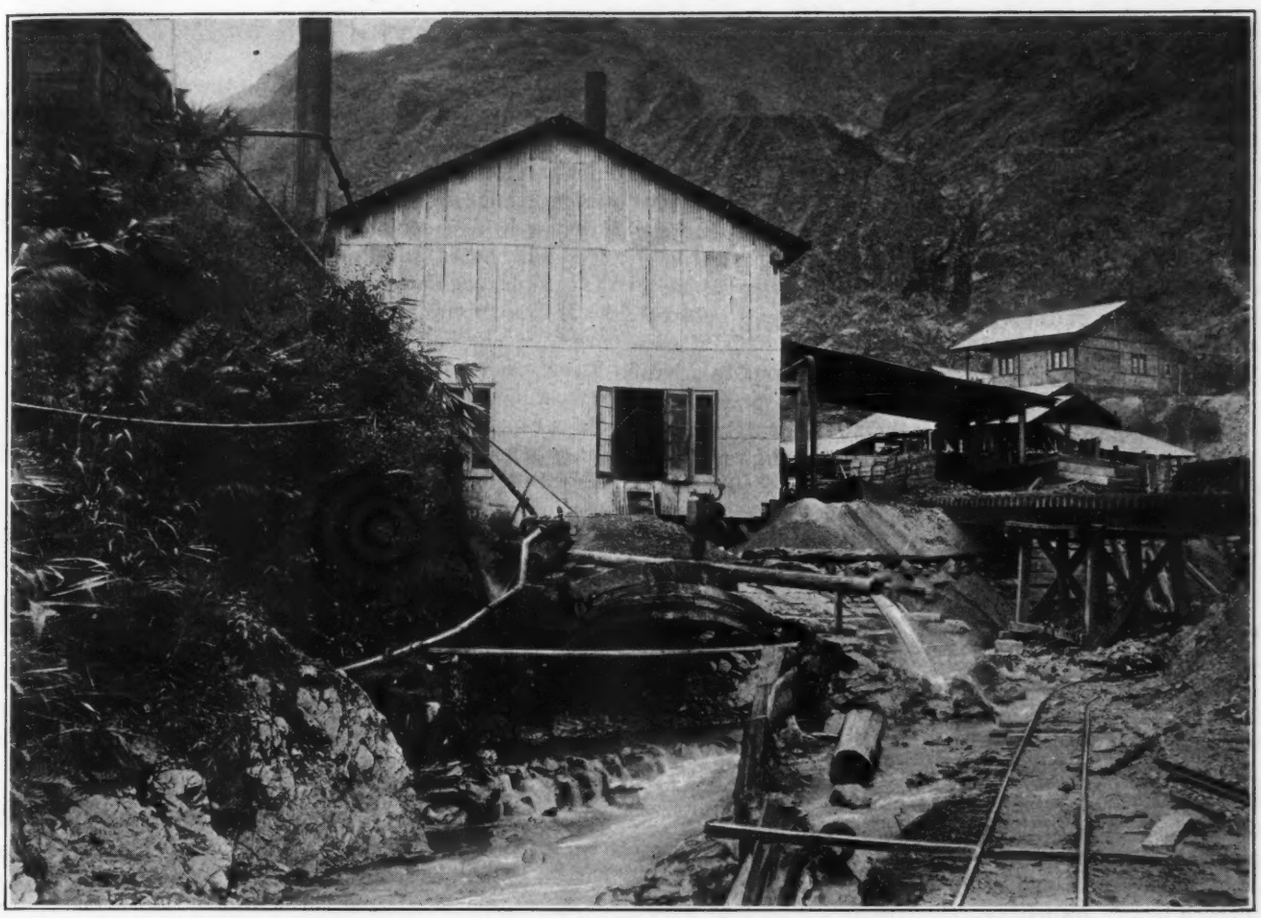
Scenes From Mining Camps of India



NAMTU BRIDGE AT BAWDWIN, UPPER BURMA, INDIA



PORTAL OF "DEAD CHINAMAN" TUNNEL OF BURMA MINES, LTD., UPPER BURMA, INDIA



OLD POWER PLANT AT BAWDWIN OF BURMA MINES, LTD., UPPER BURMA, INDIA

BAWDWIN GOSSAN QUARRY, SHOWING OXIDIZED OUTCROPS MINED FOR SILICA FLUX

What Is Bolshevism?*

THOMAS CARLYLE cried years ago, half in wrath, half in despair, "Oh, if men only would think!" No man in his time pondered more upon the idiosyncrasies of his fellow-men than did this old Scotch philosopher, and no man has described human society in the chaos of fermentation as he has done. It was quite evident to him, as it is to many of us, that men as a rule do not give thought to matters beyond their daily tasks, for if they did false philosophies would be laughed into the oblivion of ridicule soon after birth.

Bolshevism is a nebulous, mysterious thing to most people. It is a chameleon in appearance, now seeming to be an integration of human Slavic elements assuming form, radiating energy, and discovering a voice, at another time a pitiable crying to mankind for brotherhood and human sympathy; and again it appears like a hive of bees swarming unintelligently as to their destiny, but compelled to readjust themselves within their environment. At still other moments it appears to be nothing more than the scum brought to the surface by the fermentation of a nation.

Bolshevism is the ideal of the ignorant dreamer of dreams, of impracticable folk and of all those who would reap where they have not sown. It is vividly illustrated in that parable in the New Testament which tells of a certain householder who, requiring men to work in his vineyards, went into the market place to hire them, first in the early morning, then at the third hour of the day, again at the sixth and ninth hours, and, finally, at the eleventh hour. As will be remembered by all who have delighted in the naïveté of this sympathetic story, when evening came the paymaster gave each man a penny for his day's work, without regard to the number of hours he had worked, and each of us has shared the righteous indignation of the men of the early morning who cried out, saying, "These last have wrought but one hour, and thou hast made them equal to us which have borne the burden and heat of the day."

Every man can make his own application of this parable. To the man who thinks, however, the following question arises inevitably, viz.: Is a social condition possible wherein the man of the eleventh hour shall rank equally with the man of the early morning, or is it conceivable that society could attain to such a beatific condition that the loafer should share on the same basis with the toiler, and the ignorant and shiftless with the educated and ambitious?

Yet Bolshevism demands this, demands it with the disingenuous insistence of childhood, and either raves when its foolish proposals are rejected, or strikes out savagely with its animal strength to acquire by brute force what it cannot gain by idealistic sophistry.

It has been revealed within the last six months that Bolshevism boiled down to a substance leaves nothing but a slime. Even the new oil flotation process for extracting the last grain of metal from the ore would fail to find anything in it which would float on a bubble. In sentiment it is an appeal that Lazarus shall be fed at the rich man's table, but in practice it is a brutal savagery which, like a wild beast, kills and tortures to vent its bestiality.

Now that Bolshevism has lit up the sky with its lurid flames, men will see more clearly, and, it is hoped, give themselves up to a little serious thought. They should know first that "isms" of this kind of the men of the eleventh hour are merely indigestive gas, a complaint, however, which demands the services of an intelligent physician, not a quack. They should also realize that the visible regulator of not only material but human destiny in this world is our good old friend Mother Nature, that she had been on the job many, many millions of years before men appeared on this planet, that she is most decidedly not fickle in her purposes, but continues constantly and with the utmost patience to work along well-defined lines, and that the broad highway of natural development is individualism demanding expression in every living thing, and constant to itself in every chemical or substance. The law of the survival of the fittest is in many ways a harsh law, but it is the law of nature, conceived to be her fundamental law by the first man who reasoned.

The law of natural selection is exceedingly unsentimental. Nature wastes no tears on the individual, or the species of plant or animal which she discards for unfitness, and yet no one has been so absurd as to apologize for her severity. Mankind has existed long enough to appreciate that nature's laws are wise. But many men of an imaginative intelligence differentiate man from nature, put him in a place apart, and maintain that all of nature's laws do not apply to him; that he has by reason of his mental development become a social being, and not an individualist, as are the trees and rivers; that international brotherhood and not individual development should be the Mecca of his social aspirations. They fancy, or, as they dignify it in the terms of their philosophy, "consciously believe" that a social state is possible in which the men of the early morning and the eleventh hour men shall share alike, when the strong shall bear lovingly the burdens of the weak, and when the man bursting with initiative shall sit in the public park with his brother the loafer and glorify Karl Marx.

Justice and truth are as pitiless as they are honest. Individualism is a natural law, cold and stern. Bolshevism appeals to men because of their weaknesses, their purely human inconsistencies. It is seized upon by some as an instrument to create delusive melodies. It expresses a desire to place men in high offices who will make every so often a general jail delivery of wealth, a Kitchenistic blood-letting of those men of the early morning who are so hated because of their intelligence and their love of labor. It is so good to feast on the fruits of the other man's vineyard. It is so delightful and so sweetly sentimental to be able, by the power of office, to say to the men of the early morning: "Is it not lawful for me to do what I will with mine own?"

Russia, a land red with murder, a State writhing like a sorely wounded python under the stabs of dreamers gone mad, self-styled lovers of mankind come into sovereign power, a country where intelligence hides in the most secret places to escape the assassin, its only crime being intelligence—this sanguinary Russia is Bolshevism come into autocratic control of the lives and affairs of a great people, and, thank God, a Bolshevism

*An article by "F. S." in the Providence *Journal*.

written on the blackboard of the world for all men to see, the sum, the difference, the product, and the quotient of Nihilism and anarchy. Let the picture of it and words descriptive of it stand there as a reminder to mankind that no matter how high the lowly are exalted in Semitic philosophy, experience and tradition teach that a nation's greatness is merely the sum of the progress of its individual citizens, and that a citizenry of ciphers will never add up to anything.

American Gold Committee's Findings

The findings of the committee appointed in July, 1918, by the Secretary of the Interior to investigate the gold-mining situation in the United States, consisting of Hennen Jennings, chairman; J. H. Mackenzie and Charles Janin, of the Bureau of Mines; and H. D. McCaskey and F. L. Ransome, of the United States Geological Survey, are now published and may be summarized as follows:

Statistics of production dating from the discovery of America in 1492 show that the annual average output was small until 1850, when the discovery of gold in California and Australia marked the beginning of large gold production. The figures show a slight decline from 1855 to the opening of the mines in the Transvaal in 1887; then there was a large increase in the yearly output until 1910, since which date there were irregular fluctuations until 1915, when a marked decline took place.

Though the increase in the output of gold has been rapid during the last 25 years, it has not kept pace with the outputs of coal, iron, copper, or petroleum, or with the rapid growth of bank deposits.

The present decrease in gold production demands serious consideration, because the maintenance of a sufficient gold reserve is essential to the security of the national finances and credits of the country. The United States is at present in the most favorable position with regard to gold reserves, holding over $3,000,000,000, or more than one-third of the gold stock of the world, but it has contracted debts on a gold basis to many times the amount existing before the war.

The principal causes of the decline in gold mining in this country are (1) the shortage of labor and higher wages caused by the war, (2) lower efficiency of available labor, (3) the great increase in the cost of supplies, and (4) higher cost of power. In addition, the depletion of certain deposits and the lower grade of ore mined in others have tended to reduce outputs.

Bankers and political economists nearly all agree that the gold standard should be maintained in principle. Since the outbreak of the war, prices of all commodities have increased greatly except that of gold, which as the standard of value is fixed at $20.67 per ounce. Thus the purchasing power of gold has decreased while the prices of other commodities have increased.

The great increase in the cost of gold mining has tended to discourage new enterprises and curtail existing operations. Many mines have been compelled to close and await more favorable conditions. Those mines that have continued operations have been able to do so only by practicing the most rigid economies and by the curtailment of development work. The average operating cost of producing a dollar's worth of gold at the large and most favored quartz mines in 1917 was 70c., as compared with 57c. for 1915. Gold mining under present conditions offers little inducement to the investment of capital.

Various means of stimulating the production of gold in the United States have been proposed, including the payment by the Government of a bonus on newly mined gold. The committee does not believe the adoption of a bonus system would be beneficial at this time.

The United States Employment Service can, if properly authorized, be of great help in diverting labor to the gold industry. Gold mining has been officially declared an essential industry, and, in the opinion of the majority of the committee, should rank in this respect with other preferred industries. Exemption from draft and deferred classification of gold labor has already been granted to a certain extent by the War Department.

The furnishing of supplies to gold mines at pre-war or cut prices does not seem to be feasible.

The elimination of the excess-profits tax on gold mining, and the encouragement of a maximum output thereby, might result in larger revenues than with the tax standing, as larger dividends paid to shareholders would mean greater revenue for general taxation. As the profits of a gold mine, no matter how large, cannot be ascribed to war conditions, but, on the contrary, are diminished by them, the remission of this tax is just.

Gold mining, as an essential industry, is entitled to preferred classification for railroad freight, and similar charges, and should receive the benefit of any modification of freight rates granted any other preferred industry.

When electric power is used, gold mines should have a high-class rating with regard to power consumption, and power should be curtailed only when necessary.

The privilege of free export and of sale to manufacturers would stimulate production and aid gold mining, and also might be a safeguard against inflation.

The committee suggests that gold and other mining companies might properly be required by law to furnish to the Government, with such frequency as may be desirable, statistics of their costs, production, and profits, and these should be available for publication.

The Government should, through the Bureau of Mines, assist in improving methods of mining and metallurgy of gold ores, particularly in the treatment of complex and low-grade ores. A wide field of work is presented here.

Some aid in reducing costs might be obtained by cooperative buying of supplies by mining companies through central agencies in each state or district, but the organization of a general system of coöperative buying would be difficult.

Possible methods of maintaining the visible gold reserve, apart from mine production are (1) the curtailment of the use of gold for manufactures, and (2) making a call on the public to turn in hoarded gold.

Further relief might be obtained by amending the War-Minerals Bill to include gold, and by voting an appropriation to be used in the search for new deposits.

Consul General Skinner cabled from London on Jan. 15 that an order in council of Jan. 14 modifies the previous order prohibiting the importation of foreign coins and authorizes for the present the importation of gold and silver coins.

Details of Practical Mining

Without drawing invidious comparisons between the various types of miners' lamps, there are undeniably characteristics in the different makes that do not conform to all requirements. That the lack of these features may be supplied by certain ingenuities is well demonstrated by the improvements that are described as being applied to a "Wolf" lamp. Usually to make improvements to a device or a machine requires the services of a first-class shop, but in this instance it was possible to make a satisfactory change simply and with the addition of materials that are to be found at any mine.

The value of a permanent center indicator requires little demonstration, and although, in this instance, the description of the indicator which we present specifies that the appliance is for installations requiring large shafting, it may be said that its use need not be confined to that alone, for true alignment in small shafting is also most desirable.

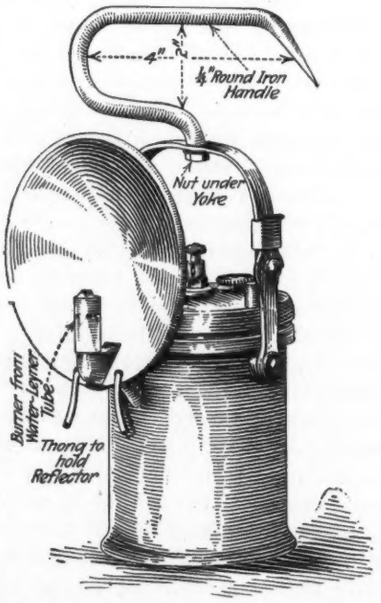
Any operator whose fortune, or misfortune, it has been to conduct small-scale operations knows the exigencies to which his work is sometimes subject. The mine may be so situated that needed materials are not available at the moment; the machinery may possess complicated parts, the replacement of which may require considerable time, and other contributing factors may hinder the operator. An idea that serves as a temporary or permanent substitute is generally a boon to the mine superintendent. It is not to be assumed that the big operator escapes, for in the article "Emergency Grouting With Sulphur," we have an instance in which it was not lack of material, facilities, or labor, but a question of the time element involved which made emergency methods imperative.

Economy and safety can be secured in underground electric haulage systems by means of a proper section insulator. Many mines make use of a separate mounting of the knife switch, which, when thrown in circuit, energizes the trolley in a drift or portion of the mine workings. But this practice will fall more into disfavor as the adoption of modern devices, which eliminate delay as well as offer the economy of cheap installation, continues.

Improving a Miner's Carbide Lamp

The hook usually furnished with the "Wolf" miner's carbide lamp, and fastened to the yoke of the upper part of the lamp by a swivel, is good enough when the lamp is to be hung up and left in one position; but when the user is climbing ladders and crawling through stopes, the swivel hook offers a decided disadvantage, as there is always the tendency for the lamp to twist, so that the flame frequently swings under the hand of the carrier, often resulting in either a bad burn or the dropping of the lamp. One manner of overcoming this disadvantage was by removing the swivel furnished with the lamp and attaching the handle shown in the accompanying illustration. This contrivance consists of a combination hook and handle, made of ¼-in. round iron and about 2 in. high by 4 in. long. It is fastened firmly to the yoke by a small nut, and does not permit the lamp to revolve; the pointed end makes it possible to hang the lamp where the manufacturer's hook will not take hold.

One means of preventing the reflector from being knocked from a lamp, and an improvement that permits its easy removal when refilling, is the following: Two small holes are punched near the bottom of the reflector, as shown in the illustration, and a leather thong or



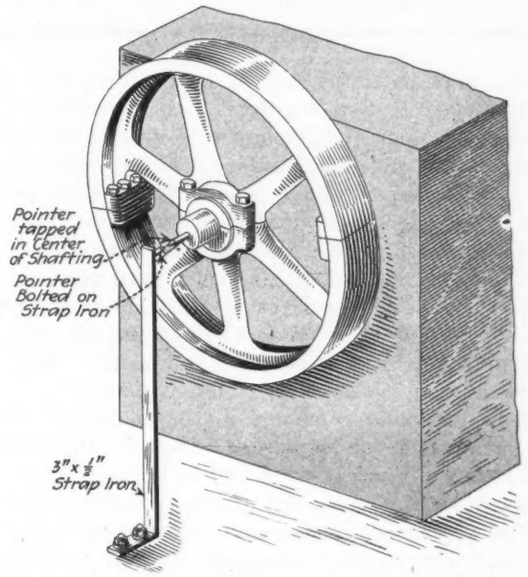
IMPROVEMENTS AND REPAIRS TO THE WOLF LAMP

cord is passed through them and around the under side of the burner-pipe. The ends of the cord should be two or three inches long, and allowed to hang free.

Burners are frequently lost or broken, and usually when no others are available. In such cases a burner can be quickly made by plugging the hole for the burner-shank with a piece of lead having a single small hole punched in it. Another type of burner may be made from a 1-in. section of Water-Leyner tube, by squeezing one of the ends together, and punching a small hole in it. The tube will fit snugly in the burner hole. By bending this piece of tube outward, the lamp will throw a horizontal flame instead of a vertical one, and this is advantageous in protecting the hands, as the flame is not so easily put out in wet places and offers the best and most lasting marker on the walls of mine workings for sampling and surveying purposes.

Permanent Center Indicator

A permanent center indicator for large machinery shafting, and one that may be cheaply and quickly installed, is shown in the accompanying illustration. Caution should be taken to insure its being placed upon a solid foundation, preferably one that is not subject to vibration by the motion of the machine itself.



PERMANENT CENTER INDICATOR FOR LARGE SHAFTING

Emergency Grouting With Sulphur

BY CARLOS E. HOLLEY*

The use of sulphur in grouting machinery foundations is not common, although there are times when it can be used to good advantage. The following experience demonstrated the efficiency of sulphur in one instance: The Colby Iron Mining Co., at Bessemer, Mich., depended on a single engine-driven generator to supply current for haulage, lighting, and some of the hoisting. The generator engine had become loose on the foundation and had worked down in the cement until it was out of line and causing trouble. It was not practicable to close down the machine for the period necessary to grout the foundation with cement, so, as a substitute, grouting with sulphur was decided upon.

At 7 o'clock on a Sunday morning the engine was closed down, jacked up, and lined up on wedges in the usual way. The foundation was then cleaned off as much as possible with compressed air, a shallow dam was built around the engine bed and molten sulphur was poured in. This hardened in a few minutes and made a neat-appearing and a durable job, and the machine was ready for operation again by 3 in the afternoon. It has now been in use for three years and is as solid as ever.

As this was our first job of grouting with sulphur, we had a few difficulties on the start. We overheated the first ladle, which caught fire and drove us out of the engine house. The sulphur is thick and syrupy when overheated and does not run well, but by keeping the ladle covered and avoiding overheating sulphur can be melted without fumes and will run freely. For work of this character I would not hesitate to use sulphur on any job where cement could be used; in fact, it has several advantages over cement. It will adhere to an oily foundation, will set quickly, and is not affected by oil. I do not recommend it for general application, because of the labor and cost, but its desirability for emergency use should not be forgotten.

*Box 58, Bessemer, Michigan.

Mine Section Insulator, With Switch

BY N. A. WAHLBERG*

In mines every cross entry should have a section insulator situated in the cross-entry trolley wire, on tangent as close as possible to the main entry. As most cross-entry trolley wires are used during but a small part of the time, it would aid in promoting safe operating conditions.

A common practice is to employ section insulators which have no switch attachment, so that it is necessary to have a knife switch connected in the circuit so that the cross-entry trolley wire may be energized. The knife switch is usually mounted in a box to protect it from moisture and dust, and there are several standard types.

Such an arrangement requires considerable amount of labor and material and is disadvantageous, as the locomotive may get stalled with the trolley wheel on the insulated part of the section insulator when the locomotive is pulling a load. Considerable delay will be experienced in case there is insufficient room to turn the trolley pole, and it is often necessary to detach several cars to enable the locomotive to get over the dead section in the overhead.

Mine operators have demanded a combination of section insulator and knife switch which would eliminate delays of this nature in their haulage service, and the type of section insulator as depicted in the accompanying illustration was developed to meet the requirements of the case and has proved successful in a number of installations.

A section insulator should not permit of any leakage whatever if the switch is open. Its construction should be mechanically strong, yet not so heavy as to add unnecessary weight in case the local conditions are such that it cannot be supported direct by means of mine suspensions from the mine roof. Two supporting lugs with longitudinal adjustment are preferable. Where conditions do not permit of using two supports and space is limited, a swivel boss in the center is desirable, as the section insulator can be easily installed without turning the complete device. The runner of the section insulator should never obstruct the passage of the trolley wheel, regardless as to whether the switch is open or closed.

SECTION INSULATOR PROVIDED WITH KNIFE SWITCH

*General engineer, Westinghouse Electric and Manufacturing Company.

Correspondence and Discussion

Enlightening America About Mexico

I was glad indeed to read what the *Journal* has recently published concerning the conditions that have prevailed in Mexico for the last five years, and to realize that it is making a sincere effort to state the facts in connection therewith. I hope that through its columns the American people may be correctly informed.

There is no occasion for vilifying, vituperating or condoning acts of Mexicans or of foreigners. If the *Journal* will tell the unadorned facts, they will speak for themselves. Unfortunately, this can seldom be done by individuals without incurring personal risk.

It must be realized that the American public has not only been kept in the dark, but it has been systematically deceived in regard to conditions. Mining men who have been repeatedly run out of the country by one group or another of bandits, barely escaping with their lives, dare not tell the American press, for they know that such interview would be clipped by some agent and forwarded to the ruling faction at the point where the outrage was committed. This would lead to destruction of the property represented by the unfortunate engineer, or to the assassin's bullet when he returned.

The boards of trade in the cities near the border have scarcely done what they might toward spreading the truth. They have been too willing to listen to the speeches of Mexican officials engaged in whitewashing Mexican conditions, and, by innuendo, blaming Americans for exciting Mexicans to violence. All of which has tended to keep our people in ignorance of what was going on south of the Rio Grande, so that looting of American properties and even assassination have gone unchecked for five years.

I trust that the *Journal* will continue to publish authentic information as it comes to hand, not only for the sake of Americans, but for the sake of nine-tenths of the natives of this unhappy land, who are peace loving and who would be industrious and orderly if they only had a fair chance.

A MANAGER IN MEXICO.

Chihuahua, Nov. 27, 1918.

The Chrome-Ore Situation

In the Jan. 11 number of the *Journal* I note that F. F. Sharpless, in writing on the question of "Chrome Ore in 1918," again suggests that the Government of the United States repudiate its obligations to the chrome-ore producer. In a previous letter, Mr. Sharpless had inferred that a request for justice would be construed as indicating a lack of patriotism.

The cloak of patriotism has been used too often to cover blunders or inefficiency in various governmental departments, and it is well to remember that the chrome producer is not responsible for the present condition of the chrome industry. Government representatives requested, as a patriotic duty of its citizens, that every effort be made to discover, develop, and produce chrome and various other ores, in order to free ships for the transportation of troops and supplies. It was also implied that legislative steps would be taken to protect those engaged in the production of these ores for a reasonable length of time, as England has done.

The war fortunately ended sooner than expected and before the necessary protective measures were passed. Does this relieve the Government of its obligation to those producers who acted in good faith? Does Mr. Sharpless suggest that it was lack of patriotism which induced miners of chrome ore to open up deposits which they knew could not be worked except on the basis of the schedules of prices published last June? Does Mr. Sharpless question their right to an equitable deal after they had to expend the amounts required for roads and development, trusting in the good faith of the Government that some provision would be made for their protection? It was poor business on their part, perhaps, but they believed that the United States needed the ore immediately, and they did not wait for Congress to act. Time was too precious—or at least they were led to believe that it was.

Now that the harm is done, Mr. Sharpless says in effect. "Be a good sport. Forget it; and mark it up to a profit and loss account." It seems to me to be beneath the dignity of the Government to seek to evade the responsibility, which its representatives incurred, in such a manner.

Does Mr. Sharpless object to the present measure before Congress which is needed for the purpose of validating orders given by Government representatives, before the armistice, by telephone, and which were accepted in good faith? How does the position of the chrome producer differ from that of the manufacturers? Mr. Sharpless admits that the authorities in Washington acknowledge, to a certain extent, a moral responsibility toward the prospector and small producer.

We could not have won the war nor achieved what we did if the authorities had not cut the red tape and acted as responsible business men do—by taking each other's words as their bonds. Mr. Sharpless certainly cannot mean to suggest that the Government's word is worthless now that the emergency is past.

Menlo Park, Calif., Jan. 20, 1919. CARR B. NEEL.

[The *Journal* does not, necessarily, champion the views of any of its correspondents, but these are published so that the subject may be seen from all angles. It has, however, consistently taken the position that any artificial interference or control in the production of metals would lead to trouble out of proportion to any benefit that might be derived. Not only was this advice given to those who desired Government interference, but to those who would be affected by it.

We are in favor of justice, whether it be toward an individual interested in mining or toward a public unin-

terested in the production of any specific metal. If the Interior Department is prepared to say: "We made specific statements that were wrong, and specific promises that we cannot fulfill," then the public, through the Interior Department, ought to make good. We are not yet advised that the Interior Department has made any such statement.—EDITOR.]

Must the Prospector Go?

The writer of the article under the above heading which appeared in the *Journal* of Jan. 2 has a clear conception of the typical prospector of the last half century, who, though he may change in appearance, will not disappear so long as there are free lands on which to roam. Gold he is after, but gold is only an incident in his life. He may not know it, but it is the free air of heaven, the blue haze of the distant mountain, the cool spring in the shade of a cottonwood, the fragrant odor of the sage, the aroma of the balsam boughs of his camp—it is these that call him, it is for these that he will suffer the tortures of the damned on the hot dry desert; for these he will endure the pangs of hunger or the misery of frozen hands and feet. If he strikes gold, the pains are less poignant. If he strikes nothing, there is no despair, for there is another summer ahead.

Years ago mining development followed the happy strike of the prospector, but the industry has outgrown its parent and is today calling for a prospector who thinks of andesite and rhyolite, of the diorite dike, and porphyry-lime contacts. He is not a picturesque character. The burro is too slow for him. His equipment is more likely to be a Ford, with an outfit that means work, and his music is the tap of hammer on steel, rather than the tap of the red-head in a dead cottonwood branch.

If by "prospector" we mean one who searches for minerals, we need him just as much or more than ever, but the man whom the industry needs today is one with some knowledge of ore formation, not necessarily a college man—preferably not a college man—but one who has consciously or unconsciously studied the veins and rocks of some district until he knows how to interpret the signs of nature. The ideal prospector of today must be an optimist, full of energy and wise in woodcraft, and must possess some real knowledge of the earth's crust. He must not be a dreamer or lover of nature, or the chances are that he will drift back to the original species. A college graduate does not usually fill the requirements. To start with, he is inclined to be pessimistic. Few college men are woodwise or trail-wise; discouragement comes too easy, and they are likely to go off into geological researches of great interest but of little practical value, so far as immediate results are concerned.

As long as there are Government lands, we need the prospector, and he has a chance for a handsome reward. We will need him after these free lands are gone, but the same inducements will not then exist. He will always be needed, because the fact that ownership of land ultimately becomes vested in private hands does not preclude the development of mineral on that land. Important operations have been going on of late years on lands that have long been privately owned. Iron, lead, zinc, copper, sulphur, coal, and many other metals are being worked on lands which our Government ceded years ago. So far as the mining industry of the United States is concerned, it will continue to grow and expand or languish, regardless of the prospector and the ownership of land, but growth will depend upon the demand for metals and the market value of the ores here and abroad.

As has recently been shown in the cases of manganese and chrome ores, when the demand for these metals suddenly became insistent, and a good price was offered, the prospector and operator appeared—the best that our country could produce. When such mines have shut down, it will be not for the reason that we lack prospectors or that they have gone to other lands; it will be for an unpoetic, economic cause—the minerals can be produced cheaper in other countries than is possible in the United States. ENGINEER.

New York, Jan. 11, 1919.

Graphite Mining in New York State

In a paper in the Jan. 18 issue of the *Journal*, under the title "Graphite Mining in New York State," by D. H. Newland, we find the following statement: "Flotation was adopted as a substitute for the buddles, but just how successful this process proved I am unable to state, as sufficient work has not been done to afford the basis for an accurate estimate."

In this connection we are pleased to advise that as engineers we reconstructed the buddle plant of the American Graphite Co., a subsidiary of the Joseph Dixon Crucible Co., at Graphite, N. Y., during the summer of 1918. This plant went into operation in September, 1918, and has been in steady operation ever since. With reference to its efficiency, we quote as follows from a letter written on Nov. 23 by the superintendent of the American Graphite Co.: "In response to your inquiry as to how the flotation system installed by your company is doing, I am happy to advise you that its performance is most satisfactory and that we are highly pleased; that it is causing us no trouble whatsoever; the recovery of graphite is excellent; grade of concentrates high; and labor costs very low." The plant has now been in continuous service for about five months and has proved superior in all respects to the old system of buddle treatment.

THE GENERAL ENGINEERING CO.

Salt Lake City, Utah, Jan. 24, 1919.

Concerning Hoisting Records

In the *Journal* of Nov. 23, 1918, page 903, a correspondent states that, at the Orient No. 1 coal mine, Franklin County, Ill., the average hoisting record for a period of six days was 5149 tons per eight-hour shift, from a 600-ft. shaft; maximum, 6008 tons. He adds, "this is the state record, if not the world's."

During a visit to the Kimberley Diamond Mines, South Africa, before the war, I found at one of the shafts, 1500 ft. deep, that it was quite usual to hoist (in two compartments) 7000 tons per nine-hour shift. Underground, the ore was dumped automatically from the cars into shaft-pockets, from which it was loaded into 11-ton skips. ROBERT PEELE.

New York, Jan. 16, 1919.

Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

Missouri Seeks Tariff on Zinc

Representative Dyer, of Missouri, has urged the lower house at Washington to act favorably on the following resolutions, adopted by the House of Representatives of Missouri:

Whereas the zinc-mining industry of southwest Missouri is the greatest metal-mining industry in the entire state; and

Whereas that industry is now crippled to the extent of the closing down of 95% of all the mines in said district, said closing down of the mines being occasioned by the vast importations of zinc ore into the United States from foreign countries, amounting in the last four years ending June 30, 1918, to 825,000 tons, being approximately three times the normal pre-war production of the entire Joplin district, including Kansas, Oklahoma, and Missouri; and

Whereas there are now approximately 350,000 tons of zinc ore on the docks in Australia awaiting shipment; and

Whereas Mexico has a potential power of production of at least 150,000 tons annually, which must find its market in the United States; and

Whereas zinc-ore concentrates have also been imported into the United States in the last three or four years from 15 different countries, representing every continent and grand division of the world: Now, therefore, be it

Resolved by the House of Representatives of the State of Missouri, That we believe it to be the patriotic duty of the Legislature of the State of Missouri to memorialize the Congress of the United States by special resolution, asking that there be at once incorporated into the pending revenue bill a provision providing for a protective tariff of 2c. per lb. on the metallic contents of zinc ore, in order to keep out further importations of zinc ore, and allow the zinc-mining industry of the United States to live and be again built up to its normal condition.

Copper Employee Delegates at Capitol

As a result of conferences with both the operators and the workmen in Western copper mines, the Secretary of Labor expects to draw up a series of conclusions which he hopes will be helpful to all concerned. For the last three weeks, Secretary Wilson has been calling quietly to Washington a number of Western copper operators. After having made himself familiar with the situation as it appears from their viewpoint, he called a meeting Jan. 31 and Feb. 1 of delegates representing the employees in copper mines, mills and smelteries of Arizona, Montana, and Utah. The delegates were as follows:

H. S. McCluskey, member of the executive board, International Union of Mine, Mill and Smelter Workers; Lester Scott and Tom O'Connor, Miami, Ariz.; Willis Miller, Globe, Ariz.; P. M. Vargas, Morenci, Ariz.; C. R. Clifford, Clifton, Ariz.; Antonio Lopez, Metcalf, Ariz.; L. E. Hart, Verde, Ariz.; J. K. Field, Clarkdale, Ariz.; A. D. Chisholm, Jerome, Ariz.; Sam Verran and James Walker, Bisbee, Ariz.; Robert Leggitt, Douglas, Ariz.; J. C. Lowney, organizer, International Union of Mine, Mill and Smelter Workers; George Tucker, J. C. McMullen, P. Delanghrey, James O'Brien, J. Mahoney, and John Buckley, Butte, Mont.; H. Whitmore, A. Hodges, and H. E. Gallagher, Great Falls, Mont.; C. M. Reynolds, James Walsh, and Thomas E. Carey, Anaconda, Mont.; F. S. Dunn, Joseph Lee, George W. Fahy, O. A. Henney, D. O. Jacobs, and J. E. Munsey, Salt Lake City, Utah.

The conference was attended also by Hywel Davies, Federal Labor Administrator for Arizona; Joseph Lord, Federal Commissioner of Conciliation for Arizona; W. D. Ryan, Western representative of the Bureau of Mines; W. M. Knerr, State Labor Commissioner of Utah; Eugene Meyer, Jr., Treasury Department, and Felix Frankfurter and H. L. Kerwin, assistants to the Secretary of Labor.

Will Pool Facts on Foreign Minerals

The suggestion by George Otis Smith, Director of the U. S. Geological Survey, that American mining men pool their information descriptive of the mineral deposits and resources of other countries has met with hearty response from more than 100 of the larger mining and metallurgical companies. The Survey already has an important nucleus around which to gather additional information as to foreign mineral deposits. Arrangements have been made with the State Department to secure the annual reports and other publications of mining companies throughout the world. A questionnaire is to be sent out through the consular service which it is expected will bring in certain pertinent facts with regard to mineral possibilities in other countries.

This is the first attempt ever made by the Government to gather systematic detailed information with regard to the sources of mineral supply with which American mines must compete or on which American industries must depend. England and Germany have gathered such information for many years.

War Contracts Bill Amended

The Senate, on Jan. 29, accepted without a roll call the amendment of Senator Henderson to the bill providing for validation of war contracts. The amendment provides for relief of producers of war minerals. The only important change made in the Henderson amendment was the striking out of the words "the production of which was requested or demanded by the War Industries Board, the Shipping Board, the Department of Interior or other agency of the Government." In lieu of the foregoing, the following was inserted:

the production of which by any claimant or claimants was requested or demanded by personal solicitation of or personal inducement to such claimant or claimants made by the War Industries Board, the Shipping Board, or the Department of the Interior.

Senator Wolcott, who proposed this change, spoke as follows in support of it:

Let us suppose that somebody embarked upon a plan of business expansion and laid out money, not as a result of any inducement offered by any Government department or any Government agent, but simply in response to some sort of general propaganda that was carried on by the Government in the form of publicity, advertisements, urging people to produce and work and get busy to help win the war; and let us suppose that a person induced by that very indefinite solicitation embarked upon that program, as I say, of business expansion, and lost by the operation. It occurs to me that that individual ought to receive no remedy under this bill. Therefore it seemed to me that the amendment as drawn was entirely too broad, and the amendment which I have offered to the amendment is designed to limit the remedies which might be availed of under the amendment offered by the Senator from Nevada.

I will say that my purpose was not by any means to extend this remedy, but rather to restrict it, and I think the language that I have drawn to an extent undoubtedly does restrict it.

Senator Henderson was not in favor of accepting the amendment, but did so to allow the bill to go to conference. The principal opposition to the Henderson amendment was voiced by Senator Frelinghuysen.

New York Meeting of A. I. M. E.

Preparations are being made for the meeting of the American Institute of Mining Engineers, to be held in New York, Feb. 17-20, by the committee on arrangements, under the chairmanship of Allen H. Rogers. Out-of-town members who expect to attend have been advised to make their hotel reservations well in advance; otherwise it may be difficult to secure accommodations.

On the opening day, Feb. 17, the Institute of Metals Division will meet both morning and afternoon, there being simultaneous sessions on "Industrial Organization." A session on "Petroleum and Gas" has also been arranged for the afternoon. At 4:30 p.m. a memorial service to Dr. Rossiter W. Raymond will be held in the auditorium.

The annual business meeting of the Institute will take place at 9:30 a.m. on Feb. 18. The sessions of the morning will be on "Principles of Mine Taxation," "Industry, Democracy, and Education" and on "Iron and Steel." The board of directors will meet at noon, afterward entertaining the officers of the Canadian Mining Institute and other distinguished visitors at a luncheon at the Engineers' Club. "International Cooperation in Mining in North America," and a "Uniform Mining Law for North America" will be the subjects of the afternoon sessions, a discussion of "Iron and Steel" also being on the afternoon program. A memorial service for the men who died in the war will be held at a special meeting at 4:30 p.m.

The National Research Council will hold a session at 10 a.m., Feb. 19, a simultaneous meeting on mining milling, and geology likewise taking place. In the afternoon, there will be a joint session with the American Institute of Electrical Engineers on the subject of electric welding. The president's reception and annual banquet will take place in the evening at the Hotel Biltmore.

Various features for entertaining the members and their guests have been provided. Among these is an all-day excursion to the Federal shipbuilding plant, at Newark, N. J., during which the launching of a ship will be witnessed. A special program has been arranged for the ladies.

The following papers are to be presented on nonferrous metallurgy and metallography at the sessions of the Institute of Metals Division:

"Effect of Temperature, Deformation, and Grain Size on the Mechanical Properties of Metals." By Zay Jeffries.

"Volatilization of Cuprous Chloride on Melting Copper Containing Chlorine." By S. Skowronski and K. W. McComas.

"Automatic Copper Plating." By J. W. Richards.

"Two Instances of Mobility of Gold in the Solid State." By E. Keller.

"Die Castings and Their Application to Our War Program." By Charles Pack.

"First Year of Leaching at New Cornelia." By H. A. Tobelmann and J. A. Potter.

"Electric Furnace Problems." By J. L. McK. Yardley.

"Comparison of Grain-size Measurements and Brinell Hardness of Cartridge Brass." By W. H. Bassett and C. H. Davis.

"Manganese Bronze." By P. E. McKinney.

"Metals and Alloys From a Colloid-Chemical Viewpoint." By Jerome Alexander.

"Standards for Brass and Bronze Foundries and Metal-Finishing Processes." By Lillian Erskine.

At the session on Feb. 17 on "Industrial Organization" the papers to be read are:

"Employment of Mine Labor." By H. M. Wilson.

"Use of Cripples in Industry." By J. P. Munroe.

"Mental Factors in Industrial Organization." By T. T. Read.

"Prevention of Illness Among Employees in Mines." By A. J. Lanza.

"Psychology Tests in Industry." By Robert M. Yerkes.

"Need of Vocational Schools in Mining Communities." By J. C. Wright.

Professional Lecture, "U. S. Employment Service." By I. W. Litchfield.

Topical discussions will also be held on the subjects of "Housing" and "Americanization" at this session. The papers to be read at the session on "Petroleum and Gas" are as follows:

"Results of Cement Plugging for Exclusion of Bottom Water in the Augusta, Kansas, Field." By H. R. Shidel.

"Water Troubles in the Mid-Continent Oil Fields, and Their Remedies." By Dorsey Hager and G. W. McPherson.

"Natural-Gas Storage." By L. S. Panyity.

"Petroleum Hydrology Applied to Mid-Continent Field." By R. O. Neal.

"Economic and Geologic Conditions Pertaining to the Occurrence of Oil in the North Argentine-Bolivian Field of South America." By S. C. Herold.

Papers, scheduled for the "Iron and Steel" session comprise:

"Does Forging Increase Specific Density of Steel?" By H. E. Doerr.

"Flaky and Woody Structures in Nickel Steel Gun Forgings." By C. Y. Clayton, F. B. Foley, and F. B. Laney.

"Static, Dynamic, and Notch Toughness." By Samuel L. Hoyt.

"Development of Grain Boundaries in Heat-Treated Alloy Steels." By R. S. Archer.

"Water-Cooled Equipment for Openhearth Steel Furnaces." By W. C. Coffin.

"Prevention of Columnar Crystallization by Rotation During Solidification." By H. M. Howe and E. C. Groesbeck.

"Basic Refractories for Openhearth." By J. Spotts McDowell and H. M. Howe.

"The Shimer Case-Hardening Process." By J. W. Richards.

"Metallographic Investigation of Transverse-Fissure Rails, With Special Reference to High-Phosphorus Streaks." By G. F. Comstock.

"Effect of Rate of Temperature Change on Transformation in an Alloy Steel." By H. Scott.

"Davidson Process of Casting Formed Tools." By J. E. Johnson, Jr.

The papers to be read at the National Research Council session are:

"Production of Ferromanganese in the Blast Furnace." By P. H. Royster.

"A Volute Aging Break." By Henry M. Howe.

"Effect of Cold-Working and Rest on Resistance of Steel to Fatigue Under Reversed Stress." By H. F. Moore and W. J. Putnam.

"Use of Manganese in Openhearth Practice." By Samuel L. Hoyt.

Report of Steel Ingot Committee, National Research Council. By Henry M. Howe, H. S. Rawdon, and F. H. Schoenfuss.

Mining, milling and geological subjects will be covered in the following papers, which also include those on coal and electrical welding:

"Notes on Certain Ore Deposits of the Southwest." By W. Tovote.

"Petrographic Notes on the Ore Deposits of Jerome, Ariz." By Marion Rice.

"Mining Methods at United Verde Extension Mining Co." By C. A. Mitke.

"Study of Shoveling as Applied to Mining." By G. Townsend Harley.

"Investigations of Aërial Transport in Mining Districts in South America." By G. M. Dyott.

"Fine Crushing in Ball Mills." By E. W. Davis.

"Problems Involved in Concentration and Utilization of Domestic Low-Grade Manganese Ore." By Edmund Newton.

"Anthracite Mine Costs." By R. V. Norris.

"Work of National Production Committee, U. S. Fuel Administration." By J. B. Neale.

"Distribution of Coal Under the U. S. Fuel Administration." By J. D. A. Morrow.

"Microstructure of Iron Deposited by Electric Arc Welding." By G. F. Comstock.

"Path of Rupture in Steel Fusion Welds." By S. W. Miller.

"Welding Mild Steel." By H. M. Hobart.

Chronology of Mining, January, 1919

Jan. 1—Anaconda company authorized $50,000,000 bond issue for equipping properties of Andes Copper and Santiago companies and for replacing invested earnings; Series A, or one-half, issued immediately.—Price-fixing agreements become illegal, except as permitted by Webb act.—United Verde Extension opened new employee's hotel at Jerome, Ariz.—Harvard's reorganized School of Engineering begins mining courses.

Jan. 2-4—Joint meeting at Denver of Colorado chapter of American Mining Congress and Colorado Metal-Mining Association.

Jan. 3—Appointment announced of H. C. Hoover as Director General of international relief commission.

Jan. 5—Special committee files report on gold production with Secretary of Interior.

Jan. 6—Arsenic and compounds removed from Export Conservation List.

Jan. 7—Petition of Minerals Separation to restrain Butte & Superior from dissipating assets denied by U. S. Supreme Court; Mar. 3 set for argument.

Jan. 8—Announced that Mineral Bank was to be established in Mexico City by British interests, to specialize in loans on mining property.—Old Dominion flotation mill at Globe, Ariz., forced down by throwing of bolt into electrical machinery, causing shutdown of company's mines and also those of Arizona Copper Company.

Jan. 10—Alaskan Juneau calls special meeting of stockholders to vote on $3,500,000 bond issue to retire floating debt and pay for altering milling plant.

Jan. 11—Application of Desert Power and Water Co. to increase rates for power supplied to Arizona mines denied by Arizona State Corporation Commission; temporary surcharge of 15½% allowed.

Jan. 13-15—Striking workmen at Morococha mines of Cerro de Pasco company, Peru, dynamite power lines, causing flooding of lower levels; Americans abandon camp.

Jan. 14—Annual meeting of Mining and Metallurgical Society of America at New York; H. H. Knox elected president for 1919.

Jan. 15—Shattuck-Arizona lead mill closed.—Copper Export Association files articles of incorporation with Federal Trade Commission and obtains permission to enter export trade under Webb law.

Jan. 15-16—California committee of the American Mining Congress meets at San Francisco to organize state chapter.

Jan. 16—Import restrictions on pyrites, graphite, graphite crucibles, iron ore, chrome ore, chromite, manganese ore and dioxide, copper ore and concentrates, and monazite sand removed by War Trade Board.

Jan. 17—Anaconda's sawmill plant at Bonner, Mont., destroyed by fire.—Perkin medal for chemical discovery presented to F. G. Cottrell at Chemists' Club, New York.—Boston & Montana Development Co. announces sale of $400,000 bond issue.—Unevida Gold Mining Co. brings action in New York Supreme Court to recover leases transferred by defendants to Comstock Recovery Lode Corporation.

Jan. 20—Calumet & Hecla and subsidiaries establish new working schedule equivalent to 75% of working time recently existing.—Control of distribution of raw materials in United States released by War Trade Board, except as to pig tin, tin ore and concentrates, jute, jute manufactures, and Egyptian cotton.—Congress informed by Senator Hitchcock that American potash industry has been protected against foreign competition by allotment of Alsace-Lorraine's potash to France and Belgium.

Jan. 21—Committee on investigation of smelting rates charged British Columbia mine operators by Consolidated Mining and Smelting Co. of Canada holds first session at Nelson, B. C.

Jan. 22—Santa Eulalia, Chihuahua, reported raided by Villistas; mining companies' safes looted as well as houses of Americans.

Jan. 23—Montana Legislature passes resolution asking Congress for relief for manganese industry in United States.—Chemical Alliance at annual meeting in New York votes to continue organization in present form.

Jan. 24—Committee on gold standard, appointed by Secretary McAdoo, reports special government or international action now unnecessary to stimulate production of gold.

Jan. 25—Committee of Copper Export Association sails for Europe to look into foreign situation.

Jan. 28-30—Committee of High-Grade Ore Producers' Association meets at Joplin, Mo., to consider organization of local chapters of American Mining Congress and American Zinc Institute.

Jan. 29—War-Contract Validation bill amended to provide relief for war-mineral producers.—Senate Foreign Relations Committee reports favorably on resolution to investigate American claims for destruction of property in Mexico since 1914.

Jan. 31—Delegates of grievance committees of copper companies' employees in Arizona, Utah and Montana confer with Secretary of Labor in Washington.

Fighting the Boche Underground

Capt. H. D. Trounce is the author of a very interesting book, entitled "Fighting the Boche Underground," that has just been published by Charles Scribner's Sons, New York ($1.50). Captain Trounce, who is an American mining engineer of British ancestry, could not resist the impulse to get into the fight early in the war. So he went over and enlisted in the British army, and, obtaining a commission in a mining regiment, served for 18 months in Flanders and in France, engaged in mining and countermining. When the United States entered the war, he obtained his release from the British service and entered the Corps of Engineers in the American army, and was engaged in equipping and training our mining engineering regiments.

In the book that he has written he has described his experiences while in the British service. He tells in simple, unaffected language how the mining operations were carried on. We have obtained a better idea of this interesting and important work from Captain Trounce's book than from anything else that we have read. We felt from beginning to end that the account was being given by one who had been engaged in the work, understood what he was doing, and was able to depict things in the right colors. Every mining engineer will be interested in reading this book.

January Mining Dividends

Mining dividends paid in January, 1919, by 27 United States mining and metallurgical companies amounted to $9,294,622, as compared with $7,443,402 paid by 32 concerns in January, 1918.

Canadian, Mexican and Central America companies paid $1,543,075 in January, 1919, and $1,215,065 a year ago.

United States Mining and Metallurgical Companies	Situation	Per Share	Total
Am. Smelters, pfd. A	U. S.-Mex.	$1.50	$148,013
Am. Smelters, pfd. B	U. S.-Mex.	1.25	44,242
Arizona Binghamton, c	Ariz.	.10	200,000
Caledonia, l.s	Ida.	.01	26,050
Camp Bird, pfd., g	Colo.	.18	110,501
Champion, c	Mich.	6.40	640,000
Cresson Cons., g	Colo.	.10	122,000
Daly, l.s	Utah	.20	30,000
Eastern Talc	Vt.	.15	10,433
Golden Cycle, g	Colo.	.03	45,000
Homestake, g	S. D.	.50	125,580
Inspiration, c	Ariz.	2.00	2,363,934
Iron Blossom, l.s	Utah	.02½	25,000
Iron Cap, c	Ariz.	.25	36,225
Magma, c	Ariz.	.50	120,000
New Idria, q	Calif.	.25	25,000
Ontario, s	Utah	.50	75,000
Oroville Dredging, g	Calif.	.12	82.385
Phelps Dodge	U. S.-Mex.	8.00	3,600,000
Plymouth Cons., g	Calif.	.24	58,520
Portland, g	Colo.	.02	60,000
Shattuck Arizona, c	Ariz.	.50	175,000
Tonopah Ex., g.s	Nev.	.05	64,140
United Eastern, g	Ariz.	.05	68,150
U. S. Smelting, com	U. S.-Mex.	1.25	438,894
U. S. Smelting, pfd	U. S.-Mex.	.87½	425,555
Vindicator, g	Colo.	.01	15,000
Wellington, g.s	Colo.	.10	100,000
Wolverine, c	Mich.	1.00	60,000
Canadian, Mexican and Central American Mines	**Situation**	**Per Share**	**Total**
Cons. Min. and Sm., c.s.l	B. C.	$0.62½	$261,936
Howe Sound, c	B. C.	.05	99,208
McKinley-Darragh-Savage, s	Ont.	.03	67,431
N. Y. & Hond. Rosario	C. A.	.50	100,000
Nipissing, g.s	Ont.	.50	600,000
Santa Gertrudis, g	Mex.	.24	364,500
Trethewey, s	Ont.	.05	50,000

The only holding company which paid in January was St. Mary's Mineral Land Co., which distributed $2 a share ($320,000), the same as last year.

Arizona Binghamton Copper Co. made its initial payment, and Caledonia began payment at the new rate of 1c. monthly, it having previously paid 3c. per month for about the last three years.

Tungsten Ore Production in 1918

The output of tungsten ores in 1918 was less than that of the preceding two years, and, according to Frank L. Hess, of the U. S. Geological Survey, was equivalent to 5065 short tons of concentrates, carrying 60% tungsten trioxide. The largest producing state was Colorado, with 1910 tons of ferberite. California produced 1781 tons of scheelite, and Nevada, 885 tons of scheelite.

A remarkable development of 1918 was the large production of scheelite in the Great Basin region from the contact metamorphic deposits, which altogether gave an output of 1413 tons. In the Eugene Mountains, about seven miles northwest of Mill City, the Nevada Humboldt Tungsten Mining Co. and the Pacific Tungsten Co. erected mills, which began work late in 1918. A 22,000-ft. pipe line, two pumping stations, and a 32½-mile power line were built by a mutual subsidiary company, the Mill City Development Co. A 3½-mile tramway, with a gasoline locomotive and steel cars, hauls the ore of the Mill City Mining Co. to the Pacific Tungsten Co.'s mill. Early in 1918 these companies shipped their ore to the mill of the Humboldt County Tungsten Mines and Mills Co. at Toulon, Nev., 60 miles southwest of their mines, for treatment. This company also treated ores from its own mines and from a number of other properties.

At Bishop, Calif., the Standard Tungsten Co. ran out of ore, and after re-treating a part of the tailings, closed its mill. The Pine Creek Tungsten Co. began active work on the development of a contact-metamorphic deposit about 25 miles northwest of Bishop, at an altitude of about 11,000 ft. The famous mine of the Atolia Mining Co., at Atolia, Calif., was the largest producer in the United States.

In the Boulder, Colo., field the tonnage of ferberite mined from the principal mines was about equivalent to that secured in 1917, but the output from the lesser mines was so much smaller that the total dropped nearly a third. The Wolf Tongue Mining Co. operated its Cold Spring mine and was the largest producer in the district.

In Arizona the production was equivalent to about 213 tons of concentrates carrying 60% tungsten trioxide, valued at $245,000, and included wolframite, hübnerite, and scheelite. The Yucca Tungsten Co. was the largest single producer.

The Homestake Mining Co. produced considerable wolframite from the replacement deposits at Lead, S. D. The production of other tungsten ores in the Black Hills was so small as to be negligible. A small quantity of scheelite was produced in Utah, and a little hübnerite was taken from Blue Grouse Mountain, near Deer Park, Washington.

California University Establishes Bureau of Occupations

The following letter was recently received from California, and speaks for itself:

Office of the Secretary
CALIFORNIA ALUMNI ASSOCIATION
114 California Hall, Berkeley, Calif.

Engineering and Mining Journal,
New York City. January 25, 1919.

We are trying to get jobs for engineers and technical men. That sums up in a sentence the whole matter of this letter.

With the signing of the armistice, our efforts have been turned as energetically as possible toward replacing men in civil life. We deal only with graduates and students. This is a comparatively narrow field, yet we find difficulties. Jobs are not plentiful, and we need the assistance of every alumnus and his active coöperation in telling us of openings. I have thought that possibly there might be some material in this which would be worth noting in the *Engineering and Mining Journal.* In a sense, this Bureau of Occupations, newly organized, is to constitute the selling organization of the university. We are going to try to place before employers the training and experience of our graduates in the most favorable way. Each year we expect to take a census of the classes and to report to men in the industries and professions all the material that is available. I feel that a genuine service can be rendered here not only to the applicant but to the business houses and to the state.

The facts above are general. Specifically, we need jobs. If you can help by publishing or by word of mouth, it will be deeply appreciated.

Sincerely,
(Signed) HOMER HAVERMALE.

Committee on Gold Standard Reports

Special Government or international action is not necessary to stimulate production of gold now that peace is in sight, the committee appointed by Secretary McAdoo to investigate the question of the gold standard reported on Jan. 24. The report says the

principal problems arising out of fear that the gold standard throughout the world might not be maintained have been largely removed by the cessation of hostilities. In reporting a like conclusion, the Federal Reserve Board has said that "there is enough gold now in the world, if properly distributed, to provide the requisite banking reserve" to handle the interest and sinking fund charges on the public debts of any nation which will submit to the necessary taxation.

The Copper Situation

These are the salient facts in the copper industry of the United States as revealed Feb. 3 at the conclusion of a series of conferences between the Secretary of Labor and miners, called for the purpose of reaching an agreement on wages:

1. There now exists an unsold stock of copper in process from the mines to the refineries or in the finished form at the refineries of approximately 1,000,000,000 lb., representing over $175,000,000 tied up in stocks. This copper was produced on a scale of wages based on a minimum price of 26c. per lb. and for every cent received under that level producers will lose $10,000,000.
2. Sales of copper since the signing of the armistice have not consumed 5% of the output of the mines.
3. A stock of copper is found to be on hand in France, England, and Italy, which, though small for war consumption, is a considerable amount for peace times, large amounts of scrap metals being for sale in connection with cancellations of munitions manufacturing programs.
4. Foreign governments having purchased their copper at 23½c. to 26c. per lb. are remarketing under government control stocks bought at those prices and meanwhile are discouraging and in some cases prohibiting imports of new stocks.
5. Copper producers had little copper sold ahead at the time the armistice was signed, as the needs of the United States and its Allies were taking close to 90% of the country's entire production, which was being supplied monthly.
6. A combination of the cessation of the export trade and the interval required to turn war industries into peace industries has brought about declining prices in copper as well as other commodities, and while prices are falling buyers lack courage to purchase.

The statement was made that accumulated copper stocks are being consumed, although for the moment the process is slow. It is pointed out that with the coming of peace northern neutrals and the Central Empires, as well as the rest of the world, will need copper. Also telephone and telegraph companies have a large amount of postponed construction work, which must soon be placed. With the coming of spring considerable general construction work may be expected, and orders will undoubtedly be placed which require copper. Emphasis was also placed on the need of giving credits to foreigners for the purpose of assisting them in making purchases here.

The statement issued after the conference disclosed that copper production in 1918 averaged 200,000,000 lb. a month, or about 2,500,000,000 lb. for the year, against a pre-war annual production of 1,500,000,000 pounds.

"When peace is proclaimed," the statement added, "and the necessary foreign credits are established in this country, sales may return to 150,000,000 lb. per month, but we can hardly expect sales to warrant a production of 200,000,000 lb. per month, as during the destructive consumption of the war.

"Advantage in operations in the near future will be confined to low-cost producers. The problem now before us is how best to safeguard the industry to insure continued operation and a living wage. The terms of the various sliding scales automatically regulate wages, according to the market price.

"Wages for January, 1919, on terms of the sliding scale, were paid on the basis of 30 to 32c. copper, although the December market price for copper was 26c., as fixed by the War Industries Board. Wages are, therefore, 50 to 75c. higher on a war basis than they would have been on a peace basis, according to the sliding scale.

"A reduction in the selling price of copper to 20c. would call for a reduction in wages of 75c. per day, or 25c. for each 2c. drop in the market. If copper drops to 18c. the reduction in wages would be $1 per day on the sliding-scale basis. Changing the sliding scale to a war basis advanced wages 50c. to $1 per day from the pre-war sliding scale rates."

After the conference it was announced that the results would be put before the miners' unions by their delegates. Approximately 30% of the workers in Arizona, Utah and Minnesota are said to have been laid off because of a falling off in the demand for copper.

Congress was urged in resolutions adopted Feb. 4 by representatives of the copper-mine workers of Utah, Arizona, and Montana to provide legislation for the extension of long-term credits to foreign countries to stimulate the copper market and relieve conditions in the industry characterized as critical. The resolutions also called upon the War and Navy departments to withhold copper stocks now on hand.

The workers, before concluding the conferences with Department of Labor officials, which had been in progress since Jan. 31, appointed a permanent committee to coöperate with managers of the industry in restoring normal conditions.

Sale of the surplus at the present market quotation of 18c., it was estimated, would mean a loss of $80,000,000 to producers. In view of conditions, department officials said, immediate measures of relief would be required to prevent further curtailment.

27th Engineers Coming Home

The 27th Engineers is now at Nantes, and expects to embark for home about Feb. 15. The service rendered by the mining regiment is almost concluded, and the men are now undoubtedly looking forward to the welcome that awaits them on this side.

The men of the 27th have the enviable privilege of recording their service in this unique regiment as part of their mining experience. As told last week, they have created a permanent organization of the 27th Engineers, and the majority of the men in the organization will probably esteem it more highly than any club or association they may ever enter. A rousing welcome is due them upon their return. In part this can be effected through the medium of the Comfort Fund, but the welcome that will count most will be the welcoming back to employment without delay.

HOW THE COMFORT FUND STANDS

Previously acknowledged	$19,653.56
W. E. Defty	10.00
Alaska Mining and Engineering Society	111.00
W. H. Corbould	6.50
Dover Laboratory	2.00
Interest to Jan. 1, 1919	105.30
L. W. Strauss	10.00
Employees, Braden Copper Co., Chile	34.00
W. C. J. Bartels	20.00
January interest	15.75
Total	$19,968.11

Checks should be made payable to W. R. Ingalls, treasurer of the Association of the 27th Engineers. Owing to the work of administering the Comfort Fund, contributions are acknowledged only in the columns of the *Journal*.

Editorials

The Economic Crime in Tin

THE War Industries Board dissolved on Dec. 31, 1918, but Mr. Armsby, Chief of the Tin Section, was obliged to remain in office to unravel, if possible, the complications that had been produced in tin. He has been conferring with the manufacturers of goods in which tin is used, in order to arrange for the allocation of the 10,169 tons purchased by the Inter-Allied Tin Executive under the direction of the United States Government and now held by the United States Steel Products Co. Mr. Armsby explains that the War Industries Board aimed to maintain a reserve stock of tin, and now desires that the United States Steel Products Co. shall not suffer any financial loss through a decline in the market. Mr. Cornish, representing one of the largest manufacturing interests, compliments Mr. Armsby upon the intelligence and patriotism of the War Industries Board in making the tin purchases, but himself demurs to taking over any proportion of the allocated tin.

The compliments that have been exchanged in this matter are something like sprinkling eau de cologne over a dead horse. Mr. Armsby has refused to disclose how much tin was held by manufacturers in this country at the time when the Inter-Allied Tin Executive was formed, but there is reason to suppose that it was large, and the War Industries Board should have known it. It is certain that the acuteness in the tin market had passed long before the American emissaries started for London, and there was probably no good reason for the adventure. The British have no sympathy for our predicament, for they say we Americans invented the pool and induced them to go into it. The plain truth of the matter is that our Government instituted a big gamble in tin, and lost. The *Journal* remembers distinctly that the probability of loss was prophesied at the time the thing was started.

The conditions that existed required that the tin purchases should be financed by some private party. The United States Steel Products Co. patriotically undertook to do the business. It finds itself now, a perfectly innocent party, holding the bag. Manifestly, it deserves and must receive proper relief.

There is just one straightforward, sound thing that can be done. This is for the Administration to go to Congress and say: "We entered upon a big gamble in tin, with the best of intentions (though perhaps with not the best judgment), for the sake of the great cause toward which everybody was coöperating. We, or rather an innocent third party whom we persuaded to aid us, are going to lose a great deal of money. Our plans were framed, however, in the interest of everybody, as we thought; so let Congress pass an appropriation for the relief of the innocent party that generously undertook to help us, and let everybody pay his share just as he is doing for other purposes."

Mr. Armsby is trying to do the wrong thing. He is trying to distribute the tin pro rata among those who used tin during 1918. But the people who used the tin directly are not the consumers. The manufacturer of babbitt metal, for example, is only a middleman. His product goes to manufacturers of bearings, but they, too, are only middlemen. The railway companies who use and wear out the bearings might be regarded as the ultimate consumers, but not so; the railways are selling public service, into the cost of which enters the metal traced back through the several manufacturers to the primary producers. Consequently, the ultimate consumer is the public, and it is the public that ought to pay.

We assure Mr. Armsby that any expedient of passing around the tin at cost price is uneconomic, and consequently unsound. We are now suffering the consequences of too many economic crimes. The more that they are continued, the worse will things be. It is unfortunate that there are public officials who are so blind that they cannot see that they are delaying the readjustment of business, and are delaying it dangerously. The idea that manufacturers, already overstocked with tin, ought to take 10,000 tons more, and pocket the loss in marketing it, is grotesque. To force such a procedure will be another economic crime that will add to national troubles.

The Railway Situation

THE daily press has set forth clearly Mr. McAdoo's plan for five years' Government control of the railroads, leading up to Government ownership. It has published the suggestions of the Interstate Commerce Commission advising the return of the railways to their various owners, in due course of time, after certain legislation has been enacted that will enable the roads to operate with greater economy and permit them to grow as the demands for railway facilities increase; and, finally, it has published the suggestions of the railway executives submitted to the Senate Interstate Commerce Committee on Jan. 8. These two sets of suggestions are similar in many respects. Both advise Government regulation of the issue of new securities, elimination of wasteful competition, pooling of equipment and terminals, and elimination of the confusion that has been produced by the numerous Federal and state commissions.

The railway executives go into further detail, asking for a Secretary of Transportation, regional boards to have jurisdiction over the roads within their district, the Interstate Commerce Commission to act as a court of appeal, and, in a broad but comprehensive manner, state the railway problems and their solution so far as they can be determined at the present time.

We call attention to the railway situation here, not because we assume that our readers have not noted

the steps already taken, but to remind them that no business, no profession, is more vitally interested in this subject than are those professions and associations connected with mines and metals; and, being vitally interested, each mining engineer should exert all possible influence toward bringing about a solution of the railway problem satisfactory to the mineral industries.

A large proportion of the income of American railways is derived from the transportation of mine products in raw or unfinished form. This fact might perhaps be questioned by one who gains his impression of transportation by riding over our Western country, where thousands after thousands of acres are devoted to the raising of farm products, but it will readily be realized by one who travels between New York and Pittsburgh, through a manufacturing country, and who passes, en route, an almost continuous train of coal, metal, and metal products.

Of the details of the suggestions offered we have nothing to say at this time, but we would point out to our mining friends that they should show their interest in the question of thoroughly equipped and efficiently operated railways, managed so that they may handle promptly all mine products and supplies which are offered, and extending so as to reach every point where there is reasonable prospect of tonnage being developed. This, in turn, means that, however managed, the roads should be given an opportunity not only to grow up to the demands, but, rather, that railway facilities should, to some extent, exceed demands, in order that business may have an opportunity to grow up to them; or, in other words, that mining business may not be curbed or lay dormant through lack of transportation facilities.

Railway rates are of the highest importance to ore producers, because the freight rate imposed often determines what is and what is not "ore." Naturally, we desire low rates so that a greater tonnage may be indicated in our ore reserves, but rates are not so vital as are the means of transportation.

Scattered throughout our land from the Atlantic to the Pacific are thousands upon thousands of tons of minerals which cannot be designated "ore" solely because so situated as to lack rail transportation to industrial centers. Given conditions under which railways can persist and thrive, such deposits must ultimately become commercially available.

The question now before the country is how to make the roads most efficient. Mr. McAdoo thinks that the best results will be produced by turning them over to the Government. Those who have worked all their lives in the service of the railways, passing from brakemen, rodmen or freight agents, through the school of experience, until they have become operating heads—these men believe that greater efficiency may be accomplished under private ownership, with Government control, than under Government ownership and operation. The Interstate Commerce Commission, with the authority acquired by 20 years of experience, concurs.

There are many—shippers, owners of securities, railway laborers, and others—who will advocate Government control, and it behooves the men of the engineering and mining industries to distinguish between these two lines of action: whether it is better to support those who, as experts, have given their advice against Government ownership, or those who have had little to do with management, and who suggest the opposite course. Whichever way we see the light, we must let our servants in Washington—our representatives—know that we have thought about the matter, and expect them to carry out our wishes.

Parenthetically, we might add that Government operation does not mean continuity of operation, as recently evidenced by the failure of the Government to keep its transportation lines in operation around New York. True, war conditions may not be considered to prevail today. But we have something very close to war conditions with us. Every ship that is afloat ought to be moving, and not laid up in our harbors waiting for cargo while the Government pleads with its employees to "please go to work, and we will talk it over."

In Canada, fortune or misfortune has brought a number of the railways into government hands. A special to the *Post*, from Ottawa, under date of Jan. 8, says: "Many people who oppose Government ownership of our railways feel that, if political management can be eliminated from the railways, public life will immensely benefit by the abolition of the persistent lobbying and intrigue with which certain railway magnates have enveloped Ottawa for some decades."

We hope that our friends in studying this question will bear in mind the intimate relation always existing between government and politics.

"Let the Job Stand"

IT IS REFRESHING to read in the Washington dispatches of Jan. 30 to the New York *Times* sentiments that, of late, have seldom come from the capital. "Let the job stand," says Charles Piez, director-general of the Emergency Fleet Corporation, and announces that there will be no advance in wages in the Pacific Coast plants. This is in response to a strike called in the Seattle yards, and another proposed for the San Francisco yards at an early date.

Mr. Piez indicated that the Corporation was ready to take a breathing spell, during which the management would have time to look around and arrange for more efficient operation within the plants. Later, it was anticipated, the men would return and be ready to give their labor for value received. He further said that there would be a discontinuance of high wages unless increased skill and output justified it. In this connection he pointed out that "in an Atlantic Coast shipyard workmen today receive $2 for the same time that brought them $1 a year ago, whereas the average output has decreased one-third." . . . "A typical example on the Pacific Coast shows an increase of 70% in pay for hours worked and a reduction of 30% in average output." Thus there has been an actual rise in pay per unit of work done of 140 to 200% within the last year.

Under the circumstances, Mr. Piez suggests that it is "highly unwise for shipyard workers, in their own interests, to call strikes at existing wages." At Seattle the demand was for $1 per hour for all workers, skilled, semi-skilled, and unskilled.

We are in perfect sympathy with high wages and high salaries. We advocate no limit, if by skill or brains they can be earned, and we are glad to support legitimate efforts for their attainment. On the other

hand, we strongly deprecate attempts by mass action or any other action to force payment for unearned service.

It strikes us that labor unions have recently accepted some rather poor advice. Prior to the signing of the armistice the shortage of labor placed the whip in the hands of the unions. That it was in many cases used to extract the last dollar, regardless of cost of living, is well understood and is amply proved by the decrease in efficiency above cited and the ever-present evidence that, in many plants, men were being paid a wage that allowed them to work for three or four days and then loaf for the remainder of the week. This was not alone Government experience, but, sad to relate, many another business has had the same story to tell.

The strike of the carpenters, and the breaking of their agreement with the Quartermaster's Department in November was both untimely and dishonest. It showed bad management on the part of the union advisers, among them W. L. Hutcheson, president of the Brotherhood of Carpenters, who supported the strikers in making a "scrap of paper" of their contract with the Government.

Union labor is losing an opportunity that may not come to it again in a long time, an opportunity to keep wages high by means of intensive effort and the elimination of waste. High wages are still being paid in those plants that are operating. Living is still high, but markets for manufactured products are poor. Here is the opportunity for labor leaders to impress a few simple facts on their followers, and urge them to get closer to the man who must provide the wherewithal to pay the wages—not further away from him. Labor leaders have been inclined to dig a trench between employer and employee, broader and broader, until the employer could not come across with the wages and the employee would not try to go across with the goods. That trench must be filled, so that both may meet and together face whatever fate has in store for them. It will be easier for all if labor leaders urge their men to coöperate with their employers, to the end that production will continue to warrant not only a living wage but one that will still leave a comfortable margin between income and outgo.

BY THE WAY

Gold weighing 1300 lb. passed through Anchorage, Alaska, recently on its way from Iditarod to Seattle, according to advices reaching the Department of the Interior, says our Washington correspondent. The treasure was moved from the interior camp on dog sleds in charge of Robert Griffis, a veteran Wells Fargo Express messenger. He receives $1.25 a lb. for delivering the gold to the agent of the express company at Seward.

"In the *Journal* of Dec. 7 was published a circular of a gentleman who wanted to buy mining properties containing practically every mineral listed in Dana's Mineralogy," writes Bela Low, of 25 Beaver St., New York. "In looking over some papers, I came across a letter which I received a few years ago while in Russia, and it occurs to me that it would not be a bad plan to introduce the aforesaid gentleman to my client in the interest of the revival of the Russian mining industry. Here is a literal translation of what the Russian gentleman offered to me: Seven claims of blister copper; two claims of iron and cast iron; one claim of bituminous coal; one claim of brass; one claim of platinum, together with lead, silver, cast iron and tin; one claim of diamonds, together with blister copper, and several lumps of diamonds."

Attention has been called to a recent decision of the Department of the Interior by the Arizona State Bureau of Mines in regard to an application received by the department for patent of a certain mining claim. This claim was located on lands after these had been withdrawn under the act of June 25, 1910, as amended by the act of Aug. 24, 1912. This amendment provides that lands so withdrawn shall at all times be open to exploration, discovery, occupation, and purchase under the mining laws of the United States, so far as the same apply to metalliferous minerals. A deposit of uranium, vanadium, and radium occurred upon the claim referred to. In the decision of the Interior Department it was held that location on such deposits was possible, but, in the nature of things, such deposits were not metalliferous minerals and as such could not be patented in the face of the withdrawal. This decision was based upon the fact that it is the salts of uranium, vanadium, and radium that are mined and used in a commercial way, and not the metals in a native state, and that they are similar in nature to potash or aluminum and are earthy, and, therefore, are not metals in the strictest sense.

Every trapshooting club is an embryo lead mine, needing only to be worked to return a rich profit, says the *Du Pont Magazine* for February. After three years of shooting over the traps of the Du Pont Club, Wilmington, Del., the grounds were mined and 23 tons of lead was recovered. The grounds at a Columbus, Ohio, gun club were mined several years ago. Twenty-six tons of lead were salvaged, one pound of shot being extracted from 60 lb. of dirt. The Elliott Shooting Park, at Kansas City, Mo., owned by Robert S. Elliott, the pioneer gun-club miner, yielded a quantity of lead worth $850 the first year it was mined. Two systems are used in recovering shot from the ground—the blower and the placer. The blower system is the simplest and the easiest to install. This method was used on the Du Pont grounds. The surface where the greatest amount of shot fell was scraped, one inch of sod and soil being removed to a shredding machine, where it was chopped up finely. A blower was attached to this machine, which was just strong enough to blow the soil out through a pipe. The shot, being heavier, fell into a trough and ran into sacks. The shot was reasonably clean and readily sold. The entire equipment was inexpensive, consisting of the shredder and the blower and a small gasoline engine to operate them. A force of four men kept the machine constantly supplied with dirt. The placer system is more complicated and more expensive to install, and a large supply of water is needed for its successful operation. This method is used by Mr. Elliott at his Kansas City park, but the immense amount of lead thrown on these grounds—more than 250,000 loads being fired annually—justified the additional expense involved in the undertaking.

Personals

Have You Contributed to the Association of the 27th Engineers?

H. Darling has been appointed manager of the Porcupine Crown mine.

Col. G. A. Burrell, recently of the Chemical Warfare Service, has opened an office as consulting chemical engineer in Pittsburgh, Pennsylvania.

Scott Lintner, of San Francisco, is now manager of the Ray-Broken Hill mines at Ray, Ariz., succeeding **George A. Laird,** who resigned in January.

Mark Workman, president of the Dominion Steel Corporation, of Sydney, N. S., will soon leave for Europe in connection with the business of the company.

C. F. Lomont, of Chicago, Ill., has recently been released from the Navy and has resumed his position as representative in the iron and copper districts of the Northwest for the Electric Service Supplies Company.

Clarence T. Emrich has resigned as chief chemist of the Old Dominion Copper, Mining and Smelting Co., Globe, Ariz., to accept the position of assistant superintendent of the International Smelting Co., at Miami, Arizona.

Colonel Ambrose Monell, who resigned from the directorate of the International Nickel Co. for service in the Army, has been reëlected to the board and to the executive committee, succeeding J. R. DeLamar, deceased.

Lafayette Hanchett, mining engineer of Salt Lake City, Utah, who has been assistant director of the United States explosive plants, is now consulting engineer for the Silver King Coalition Mines Co., operating at Park City, Utah.

Paul Hammerich, formerly manager of the Jacobs Asbestos Mining Co., and recently in charge of the interests of the Pennington Asbestos Co., at Robertsonville, Quebec, Canada, has been appointed asbestos inspector for several American firms.

Eugene P. McCrorken, until recently ensign, U. S. Naval Reserve Force, Bureau of Steam Engineering, Aviation Division, has returned to his former position on the editorial staff of the "Engineering and Mining Journal," having been discharged from the service.

Lawrence Eddy, recently mill superintendent of the Kennecott Copper Corporation's plant, Kennecott, Alaska, is now general superintendent of the charcoal iron furnaces and chemical plant of the Barnum-Richardson Co., at East Canaan, Connecticut.

Chester Naramore, chief petroleum technologist of the U. S. Bureau of Mines, Washington, D. C., has resigned to accept private employment. He is succeeded by **James O. Lewis,** petroleum geologist, who was formerly in charge of the experiment station of the U. S. Bureau of Mines, at Bartlesville, Oklahoma.

Edward Higgins, formerly engineer for the California Metal Producers' Association, has resigned to accept a position on the engineering staff of Bulkeley Wells, with headquarters in San Francisco. He is succeeded by **C. H. Fry,** who was formerly superintendent of the Yellow Aster mine, at Randsburg, California.

Thomas F. Cole has resigned as president of the North Butte Mining Co. He was one of the organizers of the company and served continuously on the board of directors and for the last seven years held the office of president. He will continue on the board. **Robert Linton,** who was first vice-president, in charge of mining and development operations, has been elected president.

L. D. Ricketts, acting general manager of the Calumet & Arizona Mining Co. and the New Cornelia Copper Co., visited Southwestern camps recently in company with a party including W. D. Thornton, of New York, president of the Greene Cananea Copper Co.; William Wraith, of the International Smelting Co.; Frederick Laist, of the Anaconda Copper Mining Co.; W. N. Tanner, A. C. Carson, and M. B. Gentry.

O. P. Hood, of Washington, D. C., registered at the New York office of the American Institute of Mining Engineers recently. Others who registered there during the last week were R. G. Wayland, of Chehalis, Wash.; David H. Ladd, Detroit, Mich.; Benjamin LeR. Miller, Bethlehem, Penn.; S. B. Patterson, Allentown, Penn.; W. E. Pratt, Fort Worth, Tex.; Lieut. E. J. Ristedt; Jesse L. Jones, Pittsburgh, Penn.; W. A. Funk, Idaho Springs, Colo.; and Capt. W. H. Bradley, Jr.

Obituary

William Rattle, Jr., mining engineer and metallurgist and head of the firm of W. J. Rattle & Son, Cleveland, Ohio, died on Jan. 21, of influenza. He was 39 years old.

George N. Collins, mining engineer, formerly of Toronto, died in San Francisco, Calif., Jan. 18, aged 34 years. He had been connected with mining companies in the United States, Mexico, and South America for many years and was recently on the staff of the New York & Honduras Rosario Mining Co., at its mines near San Juancito, Honduras.

Rolla C. Carpenter, professor of experimental engineering, Cornell University, died on Jan. 19 at his home in Ithaca, N. Y., aged 66 years. He was in active charge of many engineering construction projects and was the author of several works on engineering. Mr. Carpenter had been a member of the American Institute of Mining Engineers for many years.

William Nicholls, superintendent of the Trout Lake concentrating plant of the Oliver Iron Mining Co., since 1908, died at Coleraine, Minn., on Dec. 18, 1918. He was one of the earliest concentrating men. Born in Gogignon, Wales, June 9, 1851, he came to the United States at an early age and after living at British Hollow, Grant County, Wis., a few years, went to the Lake Superior district, where he began work at the Quincy mill. Later he had charge of the Petherick and St. Clair mills, in Keweenaw County, and was superintendent of the Phoenix mill for 13 years. When the Phoenix closed, he moved to Lake Linden, where he was connected with the Calumet & Hecla mills for four years. He then went to Montana, where he had charge of the old Elling & Morris stamp mill at Pony, Madison County. Later he was superintendent of the Alta concentrator for the Helena & Livingston Smelting and Reduction Co., at Corbin and also had charge of the Comet and the Hope mills in Jefferson County. In 1893 Mr. Nicholls went to the Coeur d'Alene district, taking charge of the Helena and Frisco mill. He also rebuilt the Morning mill, at Mullan, Idaho, and was later superintendent at the Last Chance mill of the Federal company, at Kellogg. He was engaged by Dr. L. D. Ricketts to assist in the construction of the Old Dominion concentrator at Globe, Ariz., and operated the mill for a year after its completion, when he was secured by the Oliver Iron Mining Co. which was experimenting with an iron-ore washing plant at Coleraine, Minn. After a few months there, Mr. Nicholls went to McGill, Nev., where he took charge of the construction of the Nevada Consolidated concentrator. He then returned to Minnesota, where he was reëngaged by the Oliver company to plan and build the Trout Lake plant. He is survived by his widow, two daughters and a son, John Nicholls, of Globe, Arizona.

Societies

American Association of Engineers, New York Chapter, will hold an open meeting at the Machinery Club, 30 Church St., Feb. 10. W. H. Finley, president of the association, will address the meeting on "Engineering Organization and Its Relation to Public Service."

National Foreign Trade Council will hold its sixth National Foreign Trade convention at the Congress Hotel, Chicago, on April 24, 25 and 26, 1919. The formal call will be issued soon by the chairman of the council, James A. Farrell, president of the United States Steel Corporation.

Minnesota Joint Engineering Board, representing the affiliated engineering societies of Minnesota, held the regular quarterly meeting in St. Paul, Jan. 25, with W. H. Hoyt, of Duluth, newly reëlected president, presiding. Coöperation of the engineer was the keynote of the meeting, and legislative matters with reference to the profession also came in for a large amount of consideration.

Society of Industrial Engineers plans a national conference at the Hotel McAlpin, New York, Mar. 18-21. The leading topics will include internal plant organization and also the elimination of fatigue. There will be a discussion of labor by employers and labor leaders for the purpose of crystallizing the attitudes representative of both labor and capital toward labor problems at the present time.

Industrial News

Bradley, Bruff & LaBarthe has been retained by the Penarroya Mining and Metallurgical Co. of Paris to design a complete lead-melting and refining plant to be erected at Penarroya, Spain.

Draeger Oxygen Apparatus Co., of Pittsburgh, Penn., announces that its corporate name was changed on Jan. 7, and is now the "American Atmos Corporation." The charter of the company remains unchanged, except to the extent that it is authorized to manufacture various forms of breathing apparatus, regardless of whether dependent upon oxygen or not. The officers and directors of the company are the same as under the old name.

Trade Catalogs

WA-5 Air Compressor. Sullivan Machinery Co., Chicago, Ill. Bulletin 75-D; 6 x 9; 12 pp.; illustrated. Descriptive of straight line type with simple steam and air cylinders.

Drill Sharpener. Sullivan Machinery Co., Chicago, Ill. Bulletin 72-C; 6 x 9; 24 pp.; illustrated. Descriptive of the Sullivan drill sharpener, for hammer-forging drill bits and shanks.

WB-3 Air Compressor. Sullivan Machinery Co., Chicago, Ill. Bulletin 75-E; 6 x 9; 12 pp.; illustrated. Descriptive of the Sullivan air compressors, with simple steam and two-stage air cylinders.

Air Compressor. Sullivan Machinery Co., Chicago, Ill. Bulletin 75-G; 6 x 9; 12 pp.; illustrated. Descriptive of the Sullivan small, belt-driven air compressors, single-stage WG-3 and two-stage WH-3.

Portable Mine-Car Air Compressor. Sullivan Machinery Co., Chicago, Ill. Bulletin 75-I; 6 x 9; 8 pp.; illustrated. Descriptive of the Sullivan portable mine-car air compressors, motor driven. Class WK-2.

Asbestos—Asbestos and Mineral Corporation, Whitehall Bldg., New York, has issued Plate VIII of a series of illustrations showing varieties of crude and fiber asbestos. The specimens shown are selected from the company's collection, and the portfolio, when complete, will include 12 reproductions of photographs which are most artistic and of great value to those interested in asbestos.

New Patents

United States patent specifications may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

Alloy (Bearing) Containing Cu, Pb and Sb. William D. Berry, New Brighton, Penn. (U. S. No. 1,286,921; Dec. 10, 1918.)

Concentrating Machinery—Head-Motion for Ore Concentrators. Charles C. Hebbard, Joplin, Mo. (U. S. No. 1,286,617; Dec. 3, 1918.)

Concentration—Magnetic-Pulley Separator. John P. Bethke, Milwaukee, Wis., assignor to Dings Magnetic Separator Co., Milwaukee Wis. (U. S. No. 1,286,511; Dec. 3, 1918.)

Crushing Mill. Thomas J. Sturtevant, Wellesley, Mass., assignor to Sturtevant Mill Co., Boston, Mass. (U. S. No. 1,286,831; Dec. 3, 1918.)

Flotation, Process of Treating Copper Ores by Sulphitization and. Niels C. Christensen, Salt Lake City, Utah, assignor to Metallurgic Improvement Corporation, Salt Lake City, Utah. (U. S. No. 1,286,532; Dec. 3, 1918.)

Flotation, Process of Treating Ores by. Niels C. Christensen, Salt Lake City, Utah, assignor to Metallurgic Improvement Corporation, Salt Lake City, Utah. (U. S. No. 1,286,531; Dec. 3, 1918.)

Furnace Door Equipped With Electrode Supporting Means. Julius R. Hall, Oak Park, Ill., assignor to Booth-Hall Co., Chicago, Ill. (U. S. No. 1,286,604; Dec. 3, 1918.)

Titanium Oxide, Pigment Made of. Louis E. Barton, Niagara Falls,, N. Y., and Henry A. Gardner, Washington, D. C., assignors to Titanium Alloy Manufacturing Co., New York, N. Y. (U. S. No. 1,286,916; Dec. 10, 1918.)

Editorial Correspondence

SAN FRANCISCO—Jan. 30

The Production of Petroleum in California in December, 1918, was 8,543,476 bbl., or 275,596 bbl. per day. Field shipments totaled 8,434,463 bbl. The daily production in November averaged 277,618 bbl. The report for December is made by the Standard Oil Co. In the seven months from May to November, the reports were issued by the petroleum war service committee and published in the Standard Oil bulletin. The Standard company has resumed the monthly reports of production and consumption beginning with December. The January bulletin will report the production data for 1918, as follows: Total production, 101,637,870 bbl.; average daily production, 278,460; new wells completed, 589; total crude-oil stocks on Dec. 31, 32,042,923 bbl., a decrease from Dec. 31, 1917, of 407,542. The decrease in daily average production in the same period was 1117 bbl. There is nothing alarming in this report of decreased crude stocks and daily production. Government litigation is largely accountable for this condition, which might have been much worse, if there had been a diminution in output. Given a fair chance to go ahead without interference, California oil producers will do well. Government control during the period the United States was engaged in the war might have affected the oil industry badly had it not been in the hands of Mark L. Requa, whose practical and decisive action relieved the early anticipation of impending disturbance of the industry.

BISBEE, ARIZ.—Jan. 31

Readjustment of Wages has been deferred until after the joint meeting called for Jan. 31 at Washington. All over Arizona, both companies and men appreciate that present conditions cannot continue much longer, and both are looking toward mutual concessions that may avoid a shutdown of the larger mines for a period. Mine owners appreciate what they would lose in the disorganization of their effective working forces, and the more conservative miners understand that any disturbance or wage demands would work almost entirely against their own interests.

Establishment of a Miners' Home and Hospital for infirm miners and their wives is provided for in a bill recently introduced in the Legislature by Mr. Sealey, of Douglas. The measure calls for an appropriation of $250,000. Only indigents are to be admitted, and all realty is to be deeded to the institution by those admitted. In case of damage suits by inmates against employers, the hospital trustees are given the right to sue and the institution is given the right to collect. In the statehood act, a large tract of land was set aside by Congress to defray the cost of establishing such an institution.

The Larger Companies of the Bisbee District have laid off few men since the demand for copper lessened. The present wage of $6.10 for miners is on the basis of 33c. copper, compared with the nominal present quotation of 20c. As many men as possible have been placed on exploration and development work. Working forces are being increased though only returning employees are being taken on, especially those who have served in the Army. It is considered remarkable that only a small proportion of the men who enlisted from Bisbee have returned thus far. Out of 447 who went from the Calumet & Arizona, only 25 have come back to their old jobs.

WALLACE, IDAHO—Jan. 31

The Mineral Production of Idaho in 1918, according to final figures reported by Robert N. Bell, state mine inspector, was in round numbers as follows: Gold, 36,000 oz.; silver, 9,572,000 oz.; lead, 290,000,000 lb.; zinc, 51,000,000 lb.; and copper, 5,000,000 pounds.

The Bunker Hill & Sullivan Company, at Kellogg, has made many changes and additions at the smeltery and refinery during the last few months, having in view economy in operation and increased capacity. Although the management has made no announcement, it is believed that the company is planning further additions and eventually will manufacture commercial products of lead. It is recalled that in a public address at Kellogg, while the smeltery was under construction, F. W. Bradley, president, stated that the manufacture of lead pigments in connection with the Kellogg plant would in time be added to the company's activities, and, at a subsequent date, he announced that the company would erect a zinc-reduction plant with an initial capacity of 300 tons. Mr. Bradley, whose headquarters are in San Francisco, is now making an extended visit to the plant at Kellogg.

Suspension of Operations by Hercules and Tamarack & Custer, and curtailment of production by other mines of the district, have been followed by the charge made by the Burke miners' union that the mining companies had promised to reimburse all employees the full amount they had paid under contracts to purchase Liberty bonds in the event that they were unable to meet the payments through lack of employment, and that the promise was not being fulfilled. The charge was reiterated by the State Federation of Labor. As a matter of fact, the mining companies made no such promise. During the drive for the Fourth Liberty Loan, James F. McCarthy, chairman of the Shoshone County committee, who is also manager of the Hecla Mining Co., gave public notice that all men subject to draft who subscribed for bonds and who were subsequently called to the service would be relieved of their obligation if they so desired and have their payments refunded. This promise was made as county chairman, applied to all persons without regard to their employment, and was faithfully kept. As evidence of the unfairness of the charge made by the union, it may be stated that the mining companies have voluntarily reimbursed employees for payments made for bonds when the request has been made upon leaving the service of the companies. When the Tamarack & Custer closed down, the management notified employees that they could turn in their bond contracts and be reimbursed for payments made.

SALT LAKE CITY—Jan. 30

The Salt Lake Stock and Mining Exchange on Jan. 25 held its annual election of officers. B. W. Dixon was elected first vice-president and acting president; J. H. Deming, second vice-president; F. R. Woolley, third vice-president; G. P. Norton, treasurer; W. D. Nebeker, trustee for third term; W. H. Stenacker, caller; H. V. Altree, secretary; E. P. Carter, marker. On meeting, the new board chose James A. Hogle, of the brokerage firm of J. A. Hogle & Co., president of the exchange.

In the Litigation Over the State Occupation Tax to be levied against mining companies, and opposed through suits brought by the Utah Copper, Judge Mining and Smelting, Silver King Consolidated and 19 other companies, a brief supporting this measure has been filed in the district court by Dan B. Shields, attorney general, and Herbert Van Dam, Jr., and Oliver C. Dalby, representing D. O. Larson, state treasurer, in answer to one filed a short time ago by the protesting companies.

Readjustment of Freight Rates on Ores and a possible return to rates approaching those of the ante-bellum period naturally appeal to operators in the Salt Lake region, facing high prices along all lines—except for metals—and seeking a way out. Whether or not such a reduction will be made is in the realm of speculation entirely. The question more readily presents itself now that there has been a reduction in freight rates on commodities from eastern and southeastern points—for a long time higher than rates to the Pacific Coast and to the intermountain region.

BUTTE, MONT.—Jan. 30

Assistance for the Manganese Industry in the United States was asked of Congress in a resolution passed unanimously on Jan. 23 by the Montana Legislature. Protection from foreign competition is sought.

The Anaconda Company has averted a crisis in the labor situation in Butte due to the oversupply of labor following the armistice. Being the owner of the Florence Hotel, a miners' lodging house capable of accommodating almost 1000 men, it threw open the doors of this hotel to all returned soldiers or sailors, where they may find lodging and board without cost until they have secured employment. The Y. M. C. A. also is participating in soldier and sailor relief and has secured the Murray residence, one of the spacious homes of Butte, its owner, T. J. Murray, turning it over in its entirety. A couple of hundred men are being housed there without cost. The "war chest" organization also has turned over its treasury to the civilian relief, and any soldier or sailor by submitting his discharge papers can secure a loan ample to carry him over, or, if he is married, sufficient to tide over his family. While the mines of Butte are operating at about 60% of normal, there is little suffering comparatively, despite the large number of idle men.

TONOPAH, NEV.—Jan. 28

Work on the Mayflower Property at Pioneer, Nev., owned by the Consolidated Mayflower Mines Co., was started last month after practical suspension since early in 1912, when the shaft and stope timbers were destroyed by fire. Control of the property has been acquired by a group of operators including J. H. Miller, co-owner, with Jesse Knight, of Utah, of the Lucky Boy mine, near Hawthorne, and a director of the Western Ore Purchasing Co.; W. J. Tobin, former president of the Mayflower and head of the Reorganized Pioneer Mines Co.; F. M. Manson, manager of the Western Ore Purchasing Co.; J. B. Kendall, for several years superintendent of the Goldfield Consolidated; and P. H. O'Neil, stock man and mine operator of California. Purchase was made from W. J. Tobin and C. M. Levy, the latter president of the Western Pacific R.R. Co., both retaining an interest. The mine is opened by an inclined shaft 530 ft. deep, and has produced a large quantity of shipping and milling ore from above the 400 level. Equipment includes a 15-stamp mill, a 90-hp. distillate engine driving a 15-drill compressor, a hoisting engine, a 60-hp. engine for driving mill, and all other necessary equipment in good order. In former operations coarse crushing left from $3 to $6 in the tailings, which were impounded. Mill capacity will be increased greatly by the addition of a ball mill, and it is planned to start milling within the next 60 days.

DENVER—Jan. 30

War-Mineral Producers in Colorado are following the activities of the executive committee of the war-minerals division of the American Mining Congress with great interest. Many Colorado operators take a gloomy view of the situation, although they hope for a favorable outcome of the effort to protect war-mineral industries from destruction as a result of the failure of the War-Minerals Act to function. It appears that bills have been presented to both houses of Congress, authorizing the Secretary of the Interior to make good the losses sustained in producing the various war minerals. Colorado tungsten producers are especially interested in the fact that the executive committee of the Mining Congress has secured the attachment of an amendment to the Chamberlain war-contract-validating measure now before the Senate, which amendment is designed to protect the tungsten industry, as well as the producers of manganese, magnesite, pyrites, chrome, and other steel-making elements in other Western states.

The Entire Assets of the Penn-Wyoming Copper Co. at Encampment, Wyo., have been purchased by Morse Bros. Machinery and Supply Co., of Denver, Colo. The Penn-Wyoming company is the owner of the Saratoga and Encampment R.R., and the Ferris Haggerty and Doane-Rambler mines at Encampment. The various subsidiary companies purchased, and their respective bond issues, are: Ferris Haggerty Copper Mining Co., $1,000,000; Battle Lake Tunnel Site Mining Co., $750,000; Saratoga and Encampment R.R. Co., $750,000; Encampment Smelting Co., $500,000; Encampment Tramway Co., $350,000; Encampment Pipe Line Ditch Co., $100,000; Emerson Electric Light Co., $50,000; Encampment Water Works Co., $50,000; Carbondale Coal Co., $20,000; North American Mercantile Co., $22,000; and Encampment Town Lot and Land Co., $8,000. The Penn-Wyoming company was the successor of the North Amer-

ican Copper Co., taking over the latter's property in 1904, which it operated under adverse conditions until 1907, since when much litigation has arisen. The company's records show a production of 6,414,011 lb. of copper from 59,000 tons of ore. The tramway connecting the Ferris Haggerty mine with the smelting works at Encampment is 16⅜ miles long. The Doane-Rambler mine has been developed to a depth of 665 ft. from the surface. The geological features of the district are described in Professional Paper No. 25 by A. C. Spencer, of the Geological Survey, published in 1904. The purchasers expect to prove the value of the mines and have them operated if conditions warrant. The smeltery and concentrator at Encampment will be dismantled and sold, it being preferable to concentrate the ore at the mines, which will necessitate the construction of a mill, or mills, there. Water rights are available at both Ferris Haggerty and Doane-Rambler mines.

EL PASO, TEX.—Jan. 28

A New Mining Law for Texas has been drafted by a committee of the El Paso Mining Circle. The draft was approved at a meeting of the Circle at the University Club on Jan. 22, and will be submitted to the Legislature. The Federal provisions regarding discovering mineral in place, before location, and the law of apex and extralateral rights are eliminated in the proposed draft. The provisions of the present Texas mining laws, requiring the preliminary expensive survey and location work as initial steps before recording the notice and before the locator knows whether his claim is accepted by the Land Commissioner, are changed to more reasonable requirements. Annual assessment work, payment of 5% royalty on the net proceeds of the mine, instead of on the gross proceeds, and other provisions that will be agreeable to the claim owner, as well as the land department, are included. The provisions of the former "Richard Burgess," mining law, of 1913, regarding the method of acquiring claims on lands leased or sold with minerals reserved, are added to the new bill. Provision for acquiring patent to the claim when five years' assessment work or its equivalent is performed follows the procedure of the United States Federal laws. S. H. Worrell, dean of the Texas School of Mines and chairman of the committee that prepared the draft, and E. F. Knott were appointed to go to Austin to endeavor to secure the passage of the new measure.

JOPLIN, MO.—Feb. 1

A $100,000 Community Drilling Corporation is being organized by the business men of Webb City, Mo., as a means to revive interest in their particular section of the district. When ore prices reached a figure where sheet ground could not be mined at a profit, most of the mines in such ground closed down, and many of the mills were moved to the richer leases in the Oklahoma-Kansas section of the field. It is the belief of the Webb City business men that many soft-ground deposits are to be found near their town, and they purpose putting down at least 200 drill holes to test their theory. The movement is being backed jointly by the Commercial Club and the Mine Operators' Association, and sufficient stock already has been subscribed to assure success. It is planned to start six drills at work in about two months. In no case will royalties of more than 10% be paid to the landowner, nor will transfers of the leases for additional royalties in excess of 5% be permitted.

The Ore-Storage Warehouse Proposition is again creating interest, which has been aroused by the report of the special committee recently appointed by the Tri-State Operators' Association at Picher, Okla. This report, which was made at a meeting of the organization held at Picher, on Jan. 22, was to the effect that the Warehouse Association has made satisfactory arrangements for financing the proposition; that one of the warehouses has been completed and will be ready to receive ore on Feb. 1; that construction of two other warehouses is well advanced; and that, in the opinion of the committee, the warehouse plan might be made a valuable aid to the ore producers of the district. The organization merely accepted the report of the committee, no endorsement being suggested or asked. It is understood that the Warehouse Association has been assured enough business to justify the opening of the Picher warehouse on Feb. 1. The basis on which loans will be made is as follows: When ore is selling below $45 basis price, loan value will be 80% of $45; between $45 and $55, 75%; between $55 and $65, 70%; between $65 and $75, 65%; over $75, no per cent. but $50 a ton on the ore. The Picher warehouse has a capacity of 17,000 tons, and the warehouses to be erected at Douthat and Tar River will have capacity of 22,000 tons each.

The American Mining Congress organized an Oklahoma-Kansas-Missouri branch in Joplin on Jan. 29, following a dinner at which the principal guests and speakers were J. F. Callbreath, secretary of the American Mining Congress; Charles T. Orr, president of the American Zinc Institute; and R. C. Allen, tax commissioner with the Bureau of Internal Revenue. The meeting was the climax of a three-day session of mining men, during which Messrs. Callbreath and Allen were shown over the field and the various details of the organization of the branch chapter were worked out. It had been hoped also to organize a branch of the American Zinc Institute at this time, but, as the constitution of that organization does not provide for local organizations, this plan was abandoned for the present. The board of directors of the new branch of the Mining Congress selected to represent Missouri includes Edgar Wallower, D. D. Dunkin, T. F. Coyne, T. J. Franks and Howard I. Young; to represent Oklahoma, George Coleman, F. N. Bendelari, Victor Rakowsky, Charles E. Schwarz, and Marshall E. Draper; to represent Kansas, P. B. Butler, D. D. Muir, D. C. Corner, John H. Capelli, and J. W. Hoffman. A board of governors will be selected at a meeting of these directors to be held on Feb. 4.

DULUTH, MINN.—Jan. 28

Dismissal of Three Lawsuits against the Oliver Iron Mining Co., totaling in damages asked nearly $225,000, has been made by District Judge W. A. Cant, after the opposing attorneys had agreed upon an amount in settlement of the claims. The suits, brought individually by the Leon Iron Co., the Gilbert Investment Co., and the Higgins Co., involved alleged secret profits reaped by the defendant company at the Norman mine, near Virginia.

HOUGHTON, MICH.—Feb. 1

Prosperity of the Houghton District is indicated by the amount of bank deposits in Houghton County, which now aggregate $20,480,000, the largest on record. Building and loan companies report that, during 1918, hundreds of copper miners have paid off all indebtedness on their homes. There is no sign of bolshevism among the miners of this district. They have accepted without complaint recent reductions or curtailments that mean a smaller pay check, appearing to realize that the metal market situation necessitates such action.

CORDOVA, ALASKA—Jan. 5

Men Destined for the Kennecott Mines, before being taken up the line, will be quartered five days at a quarantine station established outside of Cordova by the Copper River & Northwestern Ry., according to the "Cordova Daily Herald." After their arrival at Kennecott they will again be detained five days. Since the outbreak of the influenza in Cordova, and the consequent cessation of travel, the mines have experienced a shortage of labor, and men will be sent there constantly through the establishment of these stations.

TORONTO—Jan. 24

The Ore-Dressing Laboratory of the Haileybury School of Mines is completed and is being given a trial run. Ore can be treated by amalgamation, gravity concentration, flotation, and cyanidation, using either a single process or a combination of processes, thus demonstrating the work in duplicate of the many mills in operation throughout the district, as well as affording wide scope for original tests. The equipment comprises a small jaw crusher, a battery of three light stamps, amalgamation plate, classifiers, tube mill, concentrating tables, agitators, thickeners and flotation machine. Douglas A. Mutch, now connected with the Coniagas mine, of Cobalt, is in charge of the initial demonstrations.

Ore Shipments From the Mandy Mine, at Schist Lake, Manitoba, during the last two years are given as follows by Dr. R. C. Wallace, Commissioner of Northern Manitoba: 1917—3300 tons shipped: copper, $261,360; gold, $6600; and silver, $6600. 1918—6000 tons shipped: copper, $624,000; gold, $12,000; and silver, $15,000; total to date, $925.560. The copper produced totaled 1,188.000 lb. in 1917, and 2,400,000 lb. in 1918. There are 12,000 tons ready for shipment. The stoping of high-grade ore has been almost completed to the 200 level, and of low-grade ore 200,000 tons has been blocked out, averaging perhaps 8 to 10% copper; 20% zinc; 10 oz gold; and 2½ oz. silver. It is expected that 15,000 tons will be shipped during the coming summer. Two hundred teams will be at work during the next three months hauling ore from Schist Lake to Sturgeon Landing. The Mandy company has taken over the water transportation outfits from the Ross Navigation company, and will itself handle the transportation in the summer.

VICTORIA, B. C.—Jan. 31

Vancouver Chamber of Mines at its recent annual meeting decided that an international mining convention would be held in the province, under the auspices of the organization, some time during this year. The date was not fixed, but it was thought important that the assembly should be made thoroughly representative of British Columbia and of the Pacific Coast states. Officers were elected as follows: Honorary president, William Sloan, Minister of Mines; honorary vice-presidents, Senator Shatford and Mayor Gale; president, A. M. Whiteside; vice-presidents, Lieut.-Col. E. G. Prior, Victoria, B. C.; and C. E. Cartwright; honorary treasurer, J. M. Ley; executive committee, Messrs. N. Thompson, G. T. Hodge, R. H. Stewart, J. M. Turnbull, S. J. Crocker, G. S. Pettipiece, I. Thomas, S. N. Miller, J. D. Kearns, H. P. McCraney, F. E. Woodside, B. G. Hawkins, W. E. Bland, A. B. Buckworth and G. S. Eldridge.

Establishment of an Iron and Steel Industry in British Columbia is the subject of a report credited to the British Columbia Advisory Committee for Scientific and Industrial Research, which has aroused the protest of many in the province. The report's general conclusion is that there is room for one large plant, provided it is assured of the whole Pacific Coast market, though conditions of manufacturing and market preclude, under present circumstances, the establishment of more than one plant. But the report is also quoted as saying—and this is what is vigorously objected to—that "there does not seem to be, however, much likelihood of the iron and steel industry ever being developed on the Pacific Coast to any large extent." In view of Dr. Alfred Stansfield's finding that apparently there is plenty of magnetite ore of the necessary purity for use in electro-smelting, and that efforts are being made to develop the iron-ore resources of the province, the latter statement is considered unjustified.

The Smelting Rate Investigation Committee, which held its first session on Jan. 21 at Nelson, B. C., for the purpose of inquiring into the rates charged by the Consolidated Mining and Smelting Co. of Canada, after taking the evidence of one witness behind closed doors, decided that it would visit the Trail smeltery and meet representatives of the management of the company, that necessary arrangements might be made for investigating the conditions relative to the operation of the plant. A circular is being issued by the committee for distribution among operators and mining men throughout the province, explaining that the inquiry has been opened and that evidence on the question will be welcomed from all who desire a hearing or are of the opinion that they have knowledge which will throw further light on the issue. In the meantime, further indication that the inquiry does not satisfy a faction of the operating miners of eastern British Columbia is furnished by a resolution passed by the Kaslo (B. C.) Board of Trade which reads as follows: "That this board place itself on record as not being satisfied with the appointment of a committee with limited power and authority for investigation into the matter of smelting rates and treatment of lead and zinc ores by the Consolidated Mining and Smelting Co.'s plant at Trail, and that we believe only by a Royal Commission can a complete and satisfactory investigation be made, and that copies of this resolution be forwarded to the Minister of Mines and the Federal Member."

MELBOURNE, AUSTRALIA—Dec. 17

A Power-Supply Bill has been introduced into the Victorian Parliament providing for the appointment of electricity commissioners who will inquire into and report on the steps which should be taken to secure the ultimate coördination or unification of all state or other electrical undertakings in Victoria; also to secure the adoption of such standards of plant and equipment, and of system, frequency and pressure, for the generation, distribution, and supply of electricity as will admit of the efficient interconnection of such undertakings. The immediate problem in Victoria is to provide in the most efficient and economical way for the steadily growing power requirements of industries. The principal inquiries will be in regard to the Morwell brown-coal deposits and to water-power resources.

The Price of Osmiridium in Tasmania was as low as £7 5s. per oz. prior to the war, but it rose gradually, until during 1918 nearly £14 was obtainable . In November, however, the market slumped suddenly to £14, and finally the metal became unsalable. One of the world's principal producing centers is on the west coast of Tasmania, namely the Savage River field. Practically the whole output is produced by fossickers (prospectors on a small scale) and recently as many as 400 men have been at work earning up to £20 per week each. Osmiridium has been found only in the wash, although a report recently was current that it had been discovered in the lode. This, however, does not appear to have been substantiated. The reason given locally for the drop in price is that a substitute has been found to replace osmiridium in the manufacture of pen points, but no definite confirmation is so far available on this side.

The Alleged Oil Fields of Papua (otherwise known as New Guinea) have been under development by the commonwealth government for several years, and although nearly £100,000 has been spent to date, little tangible result has been obtained. Extensive geological examinations have been made, but only 2000 gal. of oil has been produced. Speaking in the House of Representatives recently, Mr. Glynn, the Minister for Home and Territories, said that so far seven bores had been sunk to depths ranging from 242 to 1800 ft., and a rig had been erected for an eighth bore. Oil was struck in No. 1 bore at 224 ft.; in No. 2 bore gas only was found; in No. 3 bore there was a little oil at 320 ft.; in No. 4 bore gas only; in No. 5 bore a small production of oil; in No. 6 bore a little oil at 182 ft. and 295 ft.; in No. 7 bore oil was struck at 185 ft., with a flow of 20 gal. per day, but this was shut off to permit further testing at greater depths. Large quantities of gas were encountered at 1100 ft. The boring plants used on the first five bores, added Mr. Glynn, were found to be entirely unsuited for any depths over 300 ft., as the strata consisted largely of soft mud under considerable pressure, which filled the bore holes as fast as they were sunk, causing them to be abandoned. Bore No. 5 was redrilled, and the oil horizon was isolated by cementing, and a small production obtained—100 gal. weekly, diminishing to 8 gal. weekly. Because of the difficulty due to mud, work was suspended in No. 6 bore, and also in No. 7, owing to the failure of all efforts to drive the 4-in. casing deeper than 1760 ft.

Agitation in the Gold-Mining Industry for some measure of encouragement is taking definite form in the proposal to organize a gold producers' association. A conference has been called for the third week in January, when the following proposals will be discussed: That a gold producers' association with a central committee be formed to look after the special interests of Australian gold producers; that this association demand the removal of embargoes on the export of new gold. that the Federal or Imperial government pay a subsidy on gold production proportionate to the increase in working costs since 1914; that the Repatriation Department subsidize the employment of returned soldiers producing low-grade and otherwise unpayable gold ores; that the Repatriation Department subsidize tribute parties composed of returned soldiers; that the association organize the coöperative buying and distribution of all gold-mining stores; that the federal government subsidize the state railway departments to allow of the carriage of stores at reduced rates; that the Australian government be urged to encourage gold prospecting by (a) removal of restrictions on the organization of gold-mining companies; (b) subsidies to prospecting parties consisting of returned soldiers in west, north and central Australia; and (c) construction of dams, wells, water bores and other means of conserving water in west, north and central Australia to serve the gold and pastoral industries.

The Mining News

ARIZONA

Cochise County

CALUMET & ARIZONA (Bisbee)—Long drifts on 1400 and 1600 levels of Junction well advanced toward known mineralized ground near Denn line, though delayed by hard rock and ventilation problems.

COPPER QUEEN (Bisbee)—Loading about 5000 cu. yd. of overburden daily by steam shovel on Sacramento Hill. Best day's work 7000 cu. yd. Two shifts working. C. & C. shaft enlarged to 1000 level. Cutting large pumping station at 800 level; when station is equipped, will resume sinking to 1800 feet.

NIGHTHAWK (Bisbee)—South drift on 450 level following copper-oxide streaks with typical district indications of nearness of orebody.

HILLTOP (Dos Cabezos)—Large sum spent in development, including two working tunnels, one 3000 ft. long, and on modern power and compressor plant. Development of several orebodies progressing. J. O. Fife president and R. O. Fife general manager.

TEJON (Gleeson)—Closed down. Has been shipping copper ore.

Gila County

GIBSON (Bellevue)—Machinery ordered for 150-ton mill unit, to work estimated reserve of 1,000,000 tons of 2¼ % ore. J. A. Norton, of New York, recently elected president. H. E. Bierce managing director.

ARIZONA COMMERCIAL (Globe)—Produced 2652 tons of ore averaging 7% Cu in first half of January, shipments having been suspended two days owing to trouble at Old Dominion mill. New shaft down 300 ft., with 500 ft. more to go. Sinking will be pushed. Curtailment in large way not imminent, as company has been operating on reduced scale for several months, owing to labor shortage.

Pima County

EL TIRO (Silverbell)—New 5-year lease taken by Percy Williams, trustee for bondholders; $95,000 worth of copper ore shipped from mine in 1918.

DAILY-ARIZONA (Tucson)—Negotiating purchase of Stratton claims, adjoining company's 33 claims in Old Hat district. Catalina Mountains.

MAGNATE (Tucson)—Twenty employees developing property, four miles south of Twin Buttes. Greatest depth reached to date 185 feet.

TWIN BUTTES EXTENSION (Tucson)—Arranging for drilling. Company formed exclusively of Tombstone residents, headed by A. V. Saunders. B. F. Holland in charge.

Pinal County

COPPER BELL (Casa Grande)—Development begun under William Kemp, of Tucson.

SILVER REEF (Casa Grande)—This and Lake Shore properties consolidated under management of Frank M. Leonard. of New York.

VEKOL (Casa Grande)—New strike of silver ore made in this old producer. E. B. Holt, formerly of Mexico, in charge.

Yavapai County

BRADSHAW REDUCTION (Crown King)—Handling 150 tons per day of gold ore from Wildflower mine, brought by two-mile aërial tramway.

GRAND ISLAND (Jerome)—Preparing to ship to Extension smeltery at Verde. Main development at 500 feet.

JEROME-VERDE (Jerome)—Exploration being pushed northward on 1300 level of Maintop.

BIG BUG (Mayer)—High-grade black oxide struck at bottom of 80-ft. shaft.

LITTLE EGYPT (Mayer)—Started shipments of 5% copper ore carrying gold and silver.

A. B. GROUP (Prescott)—Property in Thumb Butte section bought from William Dearing by Kyle & Bartlett, of Denver. Old tunnel being cleared out.

CALIFORNIA

Amador County

CENTRAL EUREKA (Sutter Creek)—Milling-grade ore reported on 3500 level across 45-ft. width of veins.

OLD EUREKA (Sutter Creek)—Shaft below 2000 ft. Orebody on 2000 level and above apparently persists at greater depth.

Butte County

DENVER (Forbestown)—New Gibson stamp mill and other improvements planned by R. H. Rountree, recent purchaser. Developed by 1200-ft. tunnel through three shoots of ore.

BLOOMER HILL (Oroville)—Will probably be reopened by National Gold Mining Co., recent purchaser. Development planned on extensive scale.

Calaveras County

MORGAN (Angels Camp)—Loring interests to develop on large scale under option. Mine was large producer in early days. Situated near Carson Hill.

UTICA (Angels Camp)—Gold Cliff and other properties to resume normal operation, labor having become more plentiful.

BERNARDI (Mokelumne Hill)—Will be reopened.

MALONEY (Mokelumne Hill)—Optioned to Oakland men, who will start development after reopening old tunnel and shaft.

Kern County

KELLY-WILLIAMS (Randsburg)—Development begun on Jan. 1 of silver-bearing ground recently located.

Nevada County

ALLISON RANCH (Grass Valley)—Management resumed by Charles K. Brocington. Mine completely unwatered. Development in progress, disclosing good ore.

IDAHO-MARYLAND (Grass Valley)—Metals Exploration Co., of New York, will not at present reopen or actively develop these recently acquired properties, it is officially stated, owing to high cost of labor and supplies. Instead of reopening Idaho-Maryland shaft, company may possibly sink new vertical shaft at some point situated centrally with respect to Idaho-Maryland properties and other adjacent holdings in Grass Valley district, which comprise Union Hill, Gold Point, South Idaho, Idaho Development, Eureka and certain fractional claims. Development for present will be prosecuted only through Union Hill shaft, now down 1200 ft. and soon to be sunk 200 or 300 ft. deeper. Officers and directors of company are: H. P. Whitney, president; Bulkeley Wells, vice-president; Thomas J. Regan, secretary-treasurer; Frederic N. Watriss and Roy H. Elliott.

MIDDLE YUBA POWER (Grass Valley)—Authorized by Railroad Commission to increase power rates. Lighting rates undisturbed. Serves 11 mining companies and 74 light consumers in Alleghany and Forest Hill, Sierra County.

ROUND MOUNTAIN GRAVEL (Nevada City)—Leased to Nevada City men, who will drive tunnel to tap channel.

San Bernardino County

DEL MAR (Barstow)—Reported sold to Eichelberger and Ichus, latter superintendent of Long Beach Canning Company.

GERTRUDE-INEZ (Daggett)—Strike of high-grade silver ore reported. Prospect shaft to be sunk. Situated in famous Calico district. W. B. Werner and F. W. Ford owners.

Santa Clara County

NEW ALMADEN (Almaden)—Strike of new body of cinnabar ore reported.

NEW GUADALUPE (San Jose)—Quarter interest purchased by H. C. Davey, in charge for many years.

Sierra County

SIXTEEN-TO-ONE (Alleghany) — New 10-stamp mill installed now in operation. Large tonnage high-grade milling ore. Underground crew increased. New development begun.

GOLD POINT (Downieville)—Plan to resume operations when snow permits.

WEHE (Downieville)—Gravel mine at St. Charles hill prepared for all-winter work by construction of snowsheds. Tunnel being advanced.

WILLOUGHBY (Downieville)—Sold to satisfy judgment for $540.

Shasta County

BALAKLALA (Coram) — Shipping 300 tons daily to Mammoth smeltery at Kennett on long-time contract.

MOUNTAIN COPPER (Keswick)—Producing 1000 tons of ore a day. Treating about 200 tons daily by flotation. Shipping remainder to smeltery at Martinez.

IDAHO

Shoshone County

NABOB CONSOLIDATED (Beeler)—W. A. Beaudry, manager, announces construction of new mill begun.

SHERMAN (Burke)—Lower tunnel has full face of lead-silver ore; struck 700 ft. east of ore in tunnel 500 ft. above and supposed to be new oreshoot. Tunnel explores vein at 1500-ft. depth. Two tunnels above, at intervals of 500 ft., in ore.

COEUR D'ALENE ANTIMONY (Kellogg) M. E. Jolley reëlected president and C. M. Powell secretary-treasurer. C. P. Blankenship, Washtucna, Wash., elected vice-president.

NATIONAL (Mullan)—Shipped 14 carloads of concentrates in January, averaging 15% copper and 40 oz. of silver, having estimated value of $3000 per car. Mill handling 300 tons per day. Ore runs about 1¼% copper and from 2 to 5 oz. silver.

KANSAS

Joplin District

LUCKY O. K. AND BREWSTER MINES, situated in Kansas, near Hockerville, Okla., taken over by Federal Mining and Smelting Co. Former to be known as O. K. mine in future, now producing regularly, mill operating single shift. Brewster concentrator almost completed. P. W. George, local manager.

MICHIGAN

Copper District

CALUMET & HECLA (Calumet)—Continuing drainage project southwest of Calumet, involving large tract of land.

SENECA (Calumet)—Delivery of crusher expected within two weeks. Plant equipped, except rock house.

FRANKLIN (Demmon)—Men voted to eliminate 20% bonus now paid, thus returning to old wage scale.

QUINCY (Hancock) — Announced 25% reduction in operations at mine and smeltery.

LAKE (Lake Mine)—Suspended operations indefinitely Feb. 1. Produced about 900,000 lb. copper in first nine months of fiscal year ending April 30.

MASS CONSOLIDATED (Mass)—Paying miners $4 per day and trammers and unskilled laborers $3.75, a reduction of 75c. from recent scale; 318 men employed, against 450 normally. Wage cut to avoid further lay-off.

VICTORIA (Victoria) — Wages reduced 15% Jan. 20, following Mass company's action.

Iron District

McKINNEY STEEL (Crystal Falls)—Has closed down Tobin mine at Crystal Falls and Tully mine at Stambaugh, throwing about 350 men out of work.

MINNESOTA

Cuyuna Range

NORTHERN MINNESOTA ORE (Deerwood)—Increased capitalization from $350,000 to $700,000. C. M. Farney, of St. Paul, was elected a director and made secretary-treasurer. Charles W. Potts, of Deerwood, is president and general manager. A. K. Knickerbocker is superintendent. Company owns fee interests in various ore properties on Cuyuna and Mesabi ranges, some of which are leased to operating companies. Shaft being sunk at Northland mine, a manganiferous iron-ore property near Cuyuna. Northland will be new shipper for 1919 and be in position to produce about 50,000 tons of low phosphorus manganiferous iron ore during year. Has completed permanent power plant building and drier; also installed machinery and erected office buildings and miners' cottages. Drifting in progress. Ore hoisting will begin early in February. Foregoing statement by Charles A. Potts.

BONNIE BELLE (Ironton) — Shipping iron ore to Zenith Furnace Co., Duluth.

SAGAMORE (Riverton)—Winston-Dear Co., of Hibbing, building camps, driving piling for trestles and completing preparations to strip for John A. Savage & Co. Will be heavy producer of manganiferous ores in season of 1919.

ADBAR DEVELOPMENT (Trommald) Drifting to orebody on 76-ft. level.

JOAN No. 4 (Trommald) — Deepening shaft. High-grade manganiferous iron produced.

ONAHMAN IRON (Trommald)—Moved main office from Duluth to 1513 Conway Bldg., Chicago.

Mesabi Range

CLEVELAND-CLIFFS (Nashwauk)—To begin underground work on new property south of Buffalo & Susquehanna pit at Hibbing. Max Barber general superintendent Company now operating Crosby mine, at Nashwauk; Helmer, at Buhl; Wade, at Kinney and Fowler mine, at Aurora.

MISSOURI

St. Francois County

ST. JOSEPH LEAD (Leadwood)—Closed Leadwood mill on Jan. 11. Now running on five-day week, resulting in present production of about 60% normal.

MONTANA

Silver Bow County

ANACONDA (Butte)—Orphan Girl fissure cut on 500 level, showing 25-ft. width of no commercial value; 18 in. of low-grade ore on foot wall being drifted on.

NORTH BUTTE (Butte)—Crosscutting delayed in Sarsfield mine by water encountered at 200-ft. point, necessitating installation of pump. No curtailment in development.

NEVADA

Nye County

NEW DEVELOPMENT WORK IN NYE COUNTY includes opening deposits of siliceous material suitable for use in manufacture of paints and glass. Northwest of Beatty, plant being built under direction of M. C. Hole for treating this material; will make three grades of product. In Ash Meadow, southern Nye County, carbonate of lime deposit, suitable for manufacture of whiting and dry colors, being opened. In same region, Standard Oil Co. developing large clay deposits. Fluorspar discovery made recently near Carrava, a station on Tonopah & Tidewater R.R. south of Rhyolite.

TONOPAH SHIPMENTS for week ended Jan. 25 totaled 7168 tons, estimated gross milling value being $121,856. Shippers were: Tonopah Belmont, 2146 tons; Tonopah Mining, 1200; Tonopah Extension, 2094; West End, 701; Jim Butler, 122; Montana, 270; Tonopah Divide, 225; MacNamara, 210; Midway, 106; Halifax, 31; and Rescue, 63 tons.

White Pine County

CONSOLIDATED COPPERMINES (Kimberly)—Alpha mine producing at rate of 175 tons daily of direct-smelting oxidized ores. Developments encouraging. Two new faces of ore cut on 1100 level west and south of producing stopes. Development on 1300 level being pushed as fast as water met will permit.

NEW JERSEY

Morris County

WHARTON STEEL CO. operating mines at Scrub Oak on double shift since Jan. 14. Eleven-foot vein reported discovered and effort being made to double output. Development proceeding rapidly.

UTAH

Beaver County.

SUPERIOR MINING (Milford)—Proposed to combine Beaver Copper, Beaver Lake Metals, and Utah United under this name, Beaver Copper being leader in step. Utah-United has good body of copper ore reported to be increasing in value with depth.

UTAH SULPHUR (Morrissey)—Producing sulphur from two retorts. Five retorts in all to be completed by Mar. 1. Company has large dumps from early work, to be retreated by special process.

Juab County

TINTIC SHIPMENTS week ended Jan. 28 amounted to 131 cars, as compared to 150 cars week preceding.

CHIEF CONSOLIDATED (Eureka)—In 1918, produced 2,354,797 oz. silver (one-fifth production of state); 4099 oz. gold; 8,019,454 lb. lead; and 600,360 lb. zinc. Much of ore developed ran high in silver, especially from lower levels. Ore shipped during 1918 totaled 66,019 tons.

TINTIC STANDARD (Eureka) — Old shaft south of present working shaft to be re-timbered and enlarged; 150 men employed.

Salt Lake County

ALTA CONSOLIDATED (Alta)—Car of sulphide ore from new find in Brain fissure brought about $40 a ton. Two more cars of ore in transit, one carbonate and other sulphide.

WOODLAWN (Alta)—Opening ore-bearing fissure by tunnel driven at depth; now in 1285 feet.

CARDIFF (Salt Lake)—Shipping lead ore of exceptionally high grade.

Summit County

PARK CITY SHIPMENTS week ended Jan. 28 were 1623 tons, as compared with 2021 tons week preceding. Silver King Coalition tram not in operation, which caused temporary cessation of shipments from property.

WASHINGTON

Stevens County

LOON LAKE COPPER (Loon Lake)—Construction of new 100-ton mill begun. Will have flotation equipment. Timber cut, rock and concrete prepared for foundations, and site cleared and opened.

CANADA

Alberta

CONSOLIDATED OIL FIELDS (Peace River)—Good gravity oil struck in well No. 1 at Peace River village at 1132-ft. depth.

British Columbia

CORK PROVINCE (Kaslo)—Refinancing arranged. Expects to start deepening shaft 200 ft. in spring and to drive main tunnel into third vein.

GIBSON (Kaslo)—Laying 2200-ft. spiral-rivetted steel pipe line, effective head 825 ft. Will convey water to generate power for running compressor and for lighting purposes. Installation by A. C. Brintnall, formerly of Washington Water Power Company.

Ontario

MILLER INDEPENDENCE (Boston Creek)—Consulting engineers advise continued development at lower levels. Will sink to 500 level with stations at 300 and 400 levels.

McKINLEY-DARRAGH (Cobalt) — Considerable ore coming from vein on 300 level in western part of property opened for 50 ft. Much of ore high grade.

OPHIR (Cobalt)—Sale of two-thirds interest to Nipissing for $150,000 ratified by shareholders. Nipissing now in possession.

CREWS-MACFARLANE (Gowganda)—Several veins opened in which high-grade shoots occur. One carload of ore shipped and another almost ready.

TECK HUGHES (Kirkland Lake)—Mill treated 2035 tons of ore in December; average value $10.12 per ton.

DODDS CLAIMS (Kowkash) — Taken over by Kowkash Gold Mines, Ltd., capitalized at $2,000,000. John L. Orn, Baltimore, president; William W. Snow, New York, vice-president; and George W. Conklin, New York, secretary-treasurer.

PORCUPINE CROWN (Porcupine) — Charles C. Dixon, of Wilmington, Del., elected director at annual meeting to represent American shareholders.

PREMIER LANGMUIR (Porcupine) — Shipped 39 tons of barite in December.

WASAPIKA (West Shining Tree)—Main vein stripped for 2000 ft., continuing strong and well defined. Main shaft down 50 ft., ore showing well in bottom. About 3840 tons ready for milling said to average $9 per ton.

MEXICO

Baja California

CAMPAGNIE DU BOLEO (Santa Rosalia)—December production of copper was 1,785,840 pounds.

Sonora

GREENE CANANEA (La Cananea) — Has curtailed production 40 per cent.

The Market Report

SILVER AND STERLING EXCHANGE

Jan.-Feb.	Sterling Exchange	Silver New York, Cents	Silver London, Pence	Feb.	Sterling Exchange	Silver New York, Cents	Silver London, Pence
30	4.7580	101⅛	48 7/16	3	4.7580	101⅛	48 7/16
31	4.7580	101⅛	48 7/16	4	4.7580	101⅛	48 7/16
1	4 7580	101⅛	48 7/16	5	4.7580	101⅛	48 7/16

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

DAILY PRICES OF METALS IN NEW YORK

Jan.-Feb.	Copper Electrolytic	Tin Spot.†	Lead N. Y.	Lead St. L.	Zinc St. L.
			4.95	4.90	6.50
30	*	67¼	@5.05	@4.95	@6.60
			4.95	4.80	6.50
31	*	67¼	@5.05	@4.90	@6.55
			4.95	4.80	6.45
1	18¼	67	@5.05	@4.85	@6.50
	18¼		4.95	4.80	6.25
3	@18¼	67	@5.05	@4.85	@6.35
			4.95	4.70	6¼
4	18¼	66¼	@5.05	@4.75	@6¼
	18		4.95		6.10
5	@18¼	66¼	@5.05	4 70	@6.15

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. Special shapes command a premium and cathodes sell at a discount.

Quotations for spelter are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis.

*Undetermined.

†For American tin of 99% grade.

LONDON

Jan.-Feb.	Copper Standard Spot	Copper Standard 3 M.	Copper Electrolytic	Tin Spot	Tin 3 M.	Lead Spot	Lead 3 M.	Zinc Spot
30	87	80	105	245½	242½	32½	29½	56
31	87	79½	105	245½	242½	32½	29½	56
1	...	...	...	...	...	...	...	...
3	88	80	(a)	245½	242½	30	28½	49
4	88	80	(a)	246	243	30	28½	49
5	85–89	79–80	105	244½	242	29½	27	48

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb.

(a) No quotation.

Metal Markets

NEW YORK—Feb. 5, 1919

Things started coming to a head this week, but in no very favorable way. The eyes of everybody became wide open to the copper situation. The official revelations from Washington that were made public this morning were of course only what was well known in the offices of the copper-producing companies. Both lead and zinc exhibited further weakness.

Our advices from London reveal about the same situation in England as here, viz., large surplus of supplies and slowness in resuscitating industrial consumption. Furthermore, there is blindness to the danger of delay, which exhibits itself in attempts to hold up the markets in order to dispose of stocks without loss, instead of forcing the issue, i.e., stimulating consumption by ocering low prices. Good opinion favors cutting the price for copper from £105 to £90@95. One thing that seems certain is that Great Britain and France will not be buyers of American metals for a long time to come. The stocks of virgin metal are huge, and including what is in semi-manufactured forms and in scrap they are alarming.

Copper, Tin, Lead and Zinc

Copper—In our report last week we said "There has not been and is not yet any market in the broad sense, but at this writing there are signs that things are coming to a head and that there will soon be conditions approaching the natural." We referred to the impending recession by the big producers from any position of aloofness that they had previously taken. During the current week more than one of them has been willing to talk business, and the copper market acquired a broader character than previously existed. For the first time since Dec. 1 are we able to say that there is a real market, although it is still only a small one and is characterized by irregularities, as naturally would be expected.

On Feb. 1 a transaction of 4,000,000 lb. at 18⅛c., f.o.b. refinery, was consummated. On Feb. 3 considerable business was done at 18⅛@18⅝c. This did not reflect any rise of the market as compared with Feb. 1, but rather was an example of the sort of irregularity to which we have referred as being natural. On Feb. 4 several transactions were made at 18⅛c. On Feb. 5 no business was reported to us, but there were firm bids at 18c. and firm offers at 18⅛c., and there were indications that copper would be obtained in quantity at nearer the lower figure than the higher.

With the reopening of the copper market, business is being done in the main on the basis of net cash, f.o.b. refineries, but there have been some transactions on delivered terms, with a small allowance of time for payment. However, the old pre-war basis of "delivered, 30 days" no longer exists. We hope that sellers will adopt net cash, f.o.b. refineries, as the common basis and will stick to it.

Copper Sheets—The base price of copper sheets is 28c. per lb. Copper wire is quoted at 21⅞@22⅜c. per lb. f.o.b. mill, carload lots.

Tin—The Government, or some of its officers, are determined to choke the allocated tin down the throats of manufacturers. As a further step in this high-handed proceeding an attempt to check the business of American smelters has been made, clearances of purchases made from them being refused. This action is being taken, we understand, in the name of the War Industries Board, although that body went out of existence Dec. 31. There is considerable doubt as to the legality of the recent actions. In the meanwhile, inasmuch as the rules relate only to lots of five tons or more, smelters are selling in lots of less than five tons and are making wholesale prices on them.

Lead—On Jan. 31 the American Smelting and Refining Co. reduced its price to 5⅛c., but that was merely in the course of following the market down, the open price being already around 5c. The business reported for the week was much less than in the previous week. In some ways the lead market exhibits signs of demoralization. There are rumors of ill-advised, uncoördinated attempts of Government bureaus, acting independently, to dispose of Government stocks at sacrifices, and unfortunately there seems to be something in these rumors.

Offerings of Mexican lead in London compelled further reduction in the official price, which came down to £30.

Zinc—The little spurt of activity that we reported last week was short-lived. The demand from galvanizers ceased abruptly, and the trifling rally in prices disappeared with it. On Feb. 3 spelter was offered in tonnages at 6.35c. at the beginning of the day and at 6.25c. at the end, transactions being made at both those figures. On Feb. 4 the market opened at 6.25c. and went down to 6⅛c. On Feb. 5 spelter was offered in large quantities at 6.20c. without finding buyers, and the market is quoted at 6.10 @ 6.15 cents.

Zinc Sheets—Unchanged at $13 per 100 lb.

Other Metals

Aluminum—31@32c. per lb.

Antimony—The market was quiet and unchanged at 7¼@7⅜c., for spot.

Bismuth—Metal of the highest purity for pharmaceutical use is quoted at $3.20 per lb. for wholesale lots—500 lb. and over.

Cadmium—Quoted at $1.40 per lb. in lots of 500 lb.

Nickel—Market quotation: Ingot, 40c.; shot, 43c.; electrolytic, 45c. per pound.

Quicksilver—This market was again weaker. We quote California virgin at $95 @98. San Francisco reports, by telegraph, $99. There were considerable arrivals of Mexican quicksilver in this market.

Silver and Platinum

Silver—The latest advises from London report the demand for rupees in India as still continuing, the reserve in silver coin and bullion being 3,177 lacs on Jan. 7 as against 3,347 lacs on Dec. 22. Shipments of silver to London for week ending Feb. 1 were 1,019,000 ounces.

Mexican dollars at New York: Jan. 30, 77⅜; Jan. 31, 77⅛; Feb. 1, 77⅛; Feb. 3, 77⅛; Feb. 4, 77⅛; Feb. 5, 77⅛.

Platinum—Easier. We quote refined ingot at $103.

Palladium—We quote $115@125.

The general stock of money in the United States on Jan. 1, 1919, totaled $7,780,793,606; of this $3,080,510,011 was in gold coin and bullion, $400,821,930 in standard silver dollars, and $241,263,989 in subsidiary silver. The money in circulation on Jan. 1 was $5,951,368,126, or $55.76 per capita. On Jan. 1, 1918, the per-capita circulation was $48.76.

Zinc and Lead Ore Markets

Joplin, Mo., Feb. 1—(From our Special Correspondent)—Zinc Ore (Joplin District)—A heavy demand by purchasers at the week-end stiffened the zinc ore market, and a large tonnage is reported sold at an advance of $1 per ton. Silicate, on the other hand, was cut $5 to $10 per ton, and the mines producing this kind of ore are preparing to close business.

Shipments

In Tons of 2000 lb.

Week ending Feb. 1	13,433
Previous week	11,825
Same week last year	8,987
Total this year	58,172
Total last year	41,410
Increase	16,762

Zinc Ore Prices, week ending Feb. 1, 1919 and 1918

	1919	1918
High-grade sulphide ore	$47.50	$69.10
Premium, basis 60% zinc	45.00	67.50
Other grades	42@38	60@50
Silicate, basis 40% zinc	30@25	33@30

Platteville, Wis., Feb. 1—Blende, basis 60% zinc, $45 base for premium grade; $40 base for high-lead blende. No sales of lead ore were reported.

Shipments reported for the week were 2142 tons blende, 75 tons galena, and no sulphur ore. For the year to date, the totals are 8004 tons blende and 410 tons galena. During the week 2920 tons blende was shipped to separating plants. A number of mines have closed, and others will soon follow as a result of low prices.

Other Ores and Minerals

Molybdenum Ore—Charles Hardy estimates the business done during January to have been well over 40 tons. For the moment buying has ceased and quotations vary. Some say 80@85c., others, 95c.@$1.

Tungsten Ore—No sales reported, and probably the ore is unsalable except at prices so low that they would be startling if indicated. The stock of tungsten ore actually in this country is very large, and arrivals from the Orient are continuing.

Pyrites—Spanish pyrites is quoted at 17c. on the basis of 10s. ocean freight. Ocean freight is now 25s.

Iron Trade Review

PITTSBURGH—Feb. 4

Demand for steel products, as well as pig iron, continues extremely light, and if producers had to depend upon current purchases for their operations they could scarcely run at all. To a large extent they are working on old orders, which will not last much longer; some, notably the subsidiaries of the U. S. Steel Corporation, are making up stocks. The Steel Corporation has large warehouses, which do practically a jobbing business, and can stock large tonnages of bars, shapes, and plates and in the case of tubular goods, wire, sheets, and tin plates the mills have a warehouse capacity as part of the equipment.

The Steel Corporation as a whole is operating at between 85 and 90% of capacity. Its pipe and tin-plate mills are running substantially full, though rail and structural mills stand at the other end of the list. Independents are operating at about 60% capacity.

There is no definite prospect that, when present orders are filled, buyers will place other orders, and the present outlook is that, until there is a definite and important revival in demand, there will be a continued decline in mill operations. This awaits the development of stable conditions and a liquidation in high costs all along the line. No matter what the price of steel may be, it costs altogether too much to put it into use.

The blast furnaces and steel mills appear to be fully capable of maintaining present prices. There is not enough business going to tempt sellers to cut prices. They consider it unlikely that there would be much buying for some time to come, no matter how far prices should drop; hence they prefer to maintain prices until the demand really arrives, and by doing so they can make a little profit in the interim. With light operations the cost of production per ton is increased.

Pig Iron—Transactions are confined to small lots, generally carloads, and even such sales are infrequent. Furnaces are holding strictly to the recognized quotations, but occasional resales are made at concessions. Deliveries on contracts are decreasing somewhat. With so much scrap resulting from the sudden discontinuance of war-steel production, the tendency will be to use more scrap and less pig iron in steel making. We quote the market steady but inactive at former quotations: Bessemer, $32.20; basic, $30; No. 2 foundry, $31; malleable, $31.50; forge, $30, f.o.b. Valley furnaces, freight to Pittsburgh being $1.40.

Steel—There is no interest whatever in sheet bars, and but little in billets. An occasional inquiry for a small lot of regular soft steel in billet form shows that mills are holding strictly to prices, and we continue to quote: Billets, $43.50; sheet bars and small billets, $47; slabs, $46; rods, $57. Discard steel and shell steel in various forms are available at low prices.

Ferromanganese—Producers of ferromanganese have reduced their nominal asking price to $200, delivered, for 70%, but there is no demand at that figure or at anything approaching it. Imported 80% is understood to be available at about $165, either direct or resale. Spiegeleisen is nominal at $65, furnace, asked by producers for 16 per cent.

Coke

Coke—A week and more ago some coke operators, having contracts with furnaces calling for negotiation as to price when Government control should come off arranged with their customers that February deliveries should be at a fixed price, such prices ranging from $5.50 down to $5.25 and possibly $5. Since then there have been offerings of small spot lots far below $5 and even down to $4, though the quality was doubtless below standard. As a rule, the larger operators are not offering coke, but are restricting production to the requirements of their contracts. Contract holders who will pay $5 to $5.50 for February deliveries will probably want March deliveries at below the market price then ruling, to equalize for high prices paid this month. There seems now to be a surplus of coke at furnaces, in transit, and on track in the Connellsville region.

MONTHLY AVERAGE PRICES OF METALS

Silver	New York			London		
	1917	1918	1919	1917	1918	1919
Jan.	75.630	88.702	101.125	36.682	44.356	48.438
Feb.	77.585	85.716	.....	37.742	42.792	.....
Mar.	73.861	88.082	.....	36.410	43.620	.....
April	73.875	95.346	.....	36.963	47.215	.....
May	74.745	99.505	.....	37.940	48.980	.....
June	76.971	99.500	.....	39.065	48.875	.....
July	79.010	99.625	.....	40.110	48.813	.....
Aug.	85.407	100.292	.....	43.418	49.077	.....
Sept.	100.740	101.125	.....	50.920	49.500	.....
Oct.	87.332	101.125	.....	44.324	49.500	.....
Nov.	85.891	101.125	.....	43.584	48.969	.....
Dec.	85.960	101.125	.....	43.052	48.492	.....
Year	81.417	96.772	.....	40.851	47.516	.....

New York quotations cents per ounce troy, 999 fine; London, pence per ounce, sterling silver, 925 fine.

Copper	New York		London			
	Electrolytic		Standard		Electrolytic	
	1918	1919	1918	1919	1918	1919
Jan.	23.500	(a)	110.000	92.238	125.000	106.619
Feb.	23.500	.....	110.000	.....	125.000	.....
Mar.	23.500	.....	110.000	.....	125.000	.....
April	23.500	.....	110.000	.....	125.000	.....
May	23.500	.....	110.000	.....	125.000	.....
June	23.500	.....	110.000	.....	125.000	.....
July	25.904	.....	119.913	.....	134.913	.....
Aug.	26.000	.....	122.000	.....	137.000	.....
Sept.	26.000	.....	122.000	.....	137.000	.....
Oct.	26.000	.....	122.000	.....	137.000	.....
Nov.	26.000	.....	122.000	.....	137.000	.....
Dec.	(a)	.....	118.447	.....	133.167	.....
Year	24.628	.....	115.530	.....	130.507	.....

(a) No Market.

Tin	New York		London	
	1918	1919	1918	1919
January	85.500	67.702	293.227	248.557
February	92.000	.....	311.525	.....
March	(a)	.....	318.875	.....
April	(a)	.....	329.905	.....
May	(a)	.....	364.217	.....
June	(a)	.....	331.925	.....
July	(a)	.....	360.347	.....
August	(a)	.....	380.900	.....
September	(a)	.....	343.905	.....
October	(a)	.....	335.543	.....
November	(a)	.....	323.550	.....
December	(a)	.....	267.736	.....
Av. year	88.750	.....	330.138	.....

(a) No average computed.

Lead	New York		St. Louis		London	
	1918	1919	1918	1919	1918	1919
January	6.782	5.432	6.684	5.316	29.00	37.227
February	6.973	.....	6.899	.....	29.00	.....
March	7.201	.....	7.091	.....	29.00	.....
April	6.772	.....	6.701	.....	29.00	.....
May	6.818	.....	6.704	.....	29.00	.....
June	7.611	.....	7.511	.....	29.00	.....
July	8.033	.....	7.750	.....	29.00	.....
August	8.050	.....	7.750	.....	29.00	.....
September	8.050	.....	7.750	.....	29.00	.....
October	8.050	.....	7.750	.....	29.00	.....
November	8.050	.....	7.750	.....	31.20	.....
December	6.564	.....	6.324	.....	40.00	.....
Year	7.413	.....	7.222	.....	30.10	.....

Spelter	New York		St. Louis		London	
	1918	1919	1918	1919	1918	1919
January	7.836	7.272	7.661	6.922	54.000	56.045
February	7.814	.....	7.639	.....	54.000	.....
March	7.461	.....	7.286	.....	54.000	.....
April	6.890	.....	6.715	.....	54.000	.....
May	7.314	.....	7.114	.....	54.000	.....
June	8.021	.....	7.791	.....	54.000	.....
July	8.688	.....	8.338	.....	54.000	.....
August	8.985	.....	8.635	.....	54.000	.....
September	9.442	.....	9.092	.....	54.000	.....
October	8.801	.....	8.451	.....	54.000	.....
November	8.491	.....	8.141	.....	54.100	.....
December	8.163	.....	7.813	.....	56.050	.....
Year	8.159	.....	7.890	.....	54.180	.....

New York and St. Louis quotations, cents per pound London, pounds sterling per long ton.

Pig Iron Pgh.	Bessemer‡		Basic‡		No. 2 Foundry	
	1918	1919	1918	1919	1918	1919
January	$37.25	$33.60	$33.95	$31.40	$33.95	$32.40
February	37.25	.....	33.95	.....	33.95	.....
March	37.25	.....	33.95	.....	33.95	.....
April	36.15	.....	32.95	.....	33.95	.....
May	36.20	.....	33.00	.....	34.00	.....
June	36.36	.....	33.16	.....	34.16	.....
July	36.60	.....	33.40	.....	34.40	.....
August	36.60	.....	33.40	.....	34.40	.....
September	36.60	.....	33.40	.....	34.40	.....
October	36.60	.....	34.40	.....	35.40	.....
November	36.60	.....	34.40	.....	35.40	.....
December	36.60	.....	34.40	.....	35.40	.....
Year	$36.67	.....	$33.70	.....	$34.45	.....

‡ As reported by W. P. Snyder & Co.

STOCK QUOTATIONS

N. Y. EXCH.†	Feb. 4
Alaska Gold M.	3⅛
Alaska Juneau	2
Am.Sm.&Ref.,com.	70⅛
Am.Sm. & Ref., pf.	107
Am.Sm.Sec., pf., A	91⅛
Am. Zinc	11
Am. Zinc, pf	39
Anaconda	58⅛
Batopilas Min	1⅛
Bethlehem Steel	59
Butte & Superior	18
Butte Cop. & Zinc	6
Cerro de Pasco	31⅛
Chile Cop.	18
Chino	33⅛
Colo. Fuel & Iron	35⅛
Crucible Steel	53⅛
Crucible Steel, pf.	90
Dome Mines	10⅛
Federal M. & S.	9
Federal M. & S., pf.	34⅛
Great Nor., ore ctf.	38⅛
Greene Cananea	43⅛
Gulf States Steel	52
Homestake	97
Inspiration Con.	43⅛
International Nickel	26⅛
Kennecott	32⅛
Lackawanna Steel	66⅛
Mexican Petrol.	167⅛
Miami Copper	22⅛
Nat'l Lead, com.	68
National Lead, pf.	108⅛
Nev. Consol.	17
Ontario Min.	7⅛
Ray Con	20⅛
Republic I.&S.,com.	73
Republic I.&S., pf.	101
Sloss-Sheffield	49⅛
Tennessee C. & C.	12⅛
U. S. Steel, com	90⅛
U. S. Steel, pf.	114⅛
Utah Copper	69⅛
Va. Iron C. & C.	55

BOSTON CURB*	Feb. 4
Alaska Mines Corp.	‡.12
Boston Ely	.92
Boston & Mont.	.47
Butte & Lon'n Dev.	.11
Calaveras	1⅛
Chief Con.	3⅛
Contact	.05
Corbin	‡.25
Cortez	.13
Crown Reserve	.42
Crystal Cop.	.20
Eagle & Blue Bell	2⅛
First Nat. Cop.	1⅛
Houghton Copper	.30
Intermountain	‡.05
Iron Blossom	.45
Iron Cap	14⅛
Majestic	.19
Mexican Metals	.21
Mines of America	.25
Mojave Tungsten	.04
Nat. Zinc & Lead	.09
Nevada-Douglas	.17
New Baltic	.75
New Cornelia	‡16
Oneco	.20
Pacific Mines	‡.35
Rex Cons.	.05
Yukon Gold	.70

SAN FRAN.*	Feb. 4
Alta	.02
Andes	.03
Best & Belcher	.02
Caledonia	.03
Challenge Con.	‡.03
Confidence	.04
Con. Virginia	‡.05
Gould & Curry	.02
Hale & Norcross	.11
Jacket-Cr. Pt.	.03
Mexican	.08
Occidental	.40
Ophir	.09
Overman	.01
Savage	.07
Sierra Nevada	.03
Union Con.	.08
Utah Con.	‡.01
Belmont	3.50
Jim Butler	.39
MacNamara	.25
Midway	.27
Mont.-Tonopah	.15
North Star	.08
Rescue Eula	.09
West End Con.	1.20
Atlanta	.04
Booth	.13
Comb. Frac.	‡.02
Florence	.12
Jumbo Extension	.12
Kewanas	.04
Nevada Hills	.03
Nevada Packard	.25
Round Mountain	.32
Silver Pick	.04
White Caps	.16

COLO. SPRINGS*	Feb. 4
Cresson Con.	4.87⅛
Doctor Jack Pot	.04
Elkton Con.	.04
El Paso	.14
Gold Sovereign	‡.02
Golden Cycle	1.74
Granite	.11
Isabella	.05⅛
Mary McKinney	.07
Portland	1.00
United Gold M.	.14⅛
Vindicator	.44

BOSTON EXCH.†	Feb. 4
Adventure	‡.60
Ahmeek	.70
Algomah	‡.30
Alloues	‡43
Ariz. Com.	11⅛
Arnold	‡.20
Bingham Mines	‡9⅛
Bonanza	‡.10
Butte-Balaklava	.21
Calumet & Ariz.	59
Calumet & Hecla	426
Centennial	‡12⅛
Copper Range	42⅛
Daly West	‡2
Davis-Daly	5⅛
East Butte	‡9⅛
Franklin	‡3⅛
Granby	‡79
Hancock	‡5⅛
Hedley	‡12
Helvetia	‡.20
Indiana	‡.80
Isle Royale	25
Keweenaw	‡1
Lake	3⅛
La Salle	2⅛
Mason Valley	‡2⅛
Mass	‡4⅛
Mayflower	2⅛
Michigan	3
Mohawk	51
New Arcadian	‡1⅛
New Idria	8⅛
North Butte	10
North Lake	40
Ojibway	‡1⅛
Old Dominion	34
Osceola	‡52
Quincy	57⅛
St. Mary's M. L.	43
Santa Fe	‡.25
Seneca	‡13⅛
Shannon	2⅛
Shattuck-Ariz.	‡14⅛
So. Lake	‡1
So. Utah	‡.10
Superior	‡5
Superior & Bost.	2⅛
Trinity	2⅛
Tuolumne	‡.82
U. S. Smelting	‡45
U. S. Smelting, pf.	45⅛
Utah Apex	2⅛
Utah Con.	‡8
Utah Metal	1⅛
Victoria	‡2
Winona	‡.90
Wolverine	18⅛
Wyandot	‡.50

N. Y. CURB†	Feb. 4
Big Ledge	.75
Butte & N. Y.	‡⅛
Butte Detroit	‡.01⅛
Caledonia	.28
Calumet & Jerome	‡⅛
Can. Cop. Corpn.	2⅛
Carlisle	‡2
Cashboy	.08
Con. Ariz. Sm.	1⅛
Con. Coppermines	5⅛
Goldfield Con.	.19
Goldfield Merger	.05⅛
Greenmonster	‡⅛
Hecla Min.	4⅛
Howe Sound	‡3⅛
Jerome Verde	‡.50
Louisiana	‡⅛
Magma	25
Marsh	.03
McKinley-Dar-Sa.	‡.47
Milford	‡.75
Mother Lode	.30
Nixon Nevada	‡.41
Ohio Cop.	‡⅛
Rawley	‡2⅛
Ray Hercules	2⅛
Richmond	‡.56
Rochester Mines	.26
St. Joseph Lead	‡12
Standard S. L.	.25
Stewart	.16
Success	‡11⅛
Tonopah	‡3⅛
Tonopah Ex.	2⅛
Tribullion	‡⅛
Troy Arizona	‡.10
United Eastern	‡4⅛
United Verde Ext.	‡35⅛
United Zinc	‡⅛
Utica Mines	‡.08

TORONTO*	Feb. 4
Adanac	.20
Bailey	.03
Beaver Con.	.40
Chambers Ferland	.09
Coniagas	2.00
Hargraves	.03
Kerr Lake	‡5.37⅛
La Rose	31⅛
Lake Shore	.90
Min. Corp of Can.	2.00
Nipissing	‡8.75
Peterson Lake	.08
Temiskaming	.35
Wettlaufer-Lor.	.03
Davidson	‡.60
Dome Exten.	.20
Dome Lake	.19
Hollinger	6.12⅛
McIntyre	1.62⅛
Newray	.12⅛
Porcu. Crown	.28
Teck-Hughes	.25
Vipond	.20
West Dome	.13

* Bid prices. † Closing prices. ‡ Last quotations.

Current Prices—Materials and Supplies

IRON AND STEEL

SHEETS—Quotations are in cents per pound in various cities from warehouse, also the base quotations from mill:

Blue Annealed	Large Mill Lots Pittsburgh	St. Louis	Chicago	San Francisco	New York Current	New York One Yr. Ago
No. 10	3.90	5.04	5.17	6.55	5.17	5.44½
No. 12	3.95	5.09	5.22	6.60	5.22	5.49½
No. 14	4.00	5.14	5.27	6.70	5.27	5.54½
Black						
Nos. 18 and 20	4.50	5.84	6.02	7.30	6.02	6.24½
Nos. 22 and 24	4.55	5.89	6.07	7.35	6.07	6.29½
No. 26	4.60	5.94	6.12	7.40	6.12	6.43½
No. 28	4.70	6.04	6.22	7.50	6.22	6.53½
Galvanized:						
No. 10	5.05	6.39	6.57	....	6.57	6.69½
No. 12	5.15	6.39	6.62	7.85	6.62	6.79½
No. 14	5.15	6.39	6.67	8.00	6.67	6.79½
Nos. 18 and 20	5.45	6.59	6.97	8.15	6.97	7.09½
Nos. 22 and 24	5.60	6.44	7.02	8.30	7.02	7.24½
No. 26	5.75	6.74	7.17	8.45	7.17	7.39½
No. 28	6.05	6.19	7.57	8.75	7.57	7.69½

STEEL RAILS—The following quotations are per gross ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	Pittsburgh Current	Pittsburgh One Year Ago	Chicago Current	Chicago One Year Ago
Standard bessemer rails	$55.00	$38.00	$65.00	$38.00
Standard openhearth rails	57.00	40.00	67.00	40.00
Light rails, 8 to 10 lb	3.13½	83.00	3.13½	68.00
Light rails, 12 to 14 lb	3.09	82.00	3.09	67.00
Light rails, 25 to 45 lb	3.00	75.00	3.00	65.00

TRACK SUPPLIES—The following prices are base per 100 lb. f. o. b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh Current	Pittsburgh One Year Ago	Chicago	St. Louis	San Francisco
Standard railroad spikes, ⅝-in. and larger	$3.70	$5.00	$4.50	$5.04	$6.15
Track bolts	4.90	6.25	5.50	Premium	7.50
Standard section angle bars	....	3.65	4.45	Premium	5.15

STRUCTURAL MATERIAL—The following are the base prices f. o. b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill, Pittsburgh	New York Current	New York 1 Yr. Ago	St. Louis	Chicago	San Francisco	Dallas
Beams, 3 to 15 in.	$2.80	$4.07	$4.19½	$4.14	$4.07	$5.25	$7.00
Channels, 3 to 15 in.	2.80	4.07	4.19½	4.14	4.07	5.25	7.00
Angles, 3 to 6 in. ¼ in. thick	2.80	4.07	4.19½	4.14	4.07	5.25	7.00
Tees, 3 in. and larger	2.80	4.12	4.19½	4.14	4.07	5.25	7.00
Plates	3.00	4.27	4.44½	4.14	4.27	5.50	7.10

STEEL SHEET PILING—The following price is base per 100 lb. f. o. b. Pittsburgh, with a comparison of a month and a year ago:

Current	One Month Ago	One Year Ago
$4–5	$4–5	$4.50

RIVETS—The following quotations are per 100 lb.:

	Mill Pittsburgh	New York Current	New York One Year Ago	Chicago	St. Louis	San Francisco	Dallas
STRUCTURAL Warehouse							
½-in. and larger	$4.40	$6.50	$7.00	$5.57	$4.74	$6.70	$7.00
CONE HEAD BOILER							
½ in. and larger	4.50	6.60	7.10	5.67	4.84	8.80	7.10
⅜ and 7/16	4.65	6.75	7.25	5.82	4.99	6.95	7.25
⅜ and ⅞	5.00	7.10	7.60	6.17	5.24	7.30	7.60

Lengths shorter than 1 in. take an extra of 50c. Lengths between 1 in. and 2 in. take an extra of 25c.

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York and St. Louis
Galvanized iron rigging	+17½%
Galvanized cast steel rigging	2½%
Bright plow steel	30%
Bright cast steel	17½%
Bright iron and iron tiller	List

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight	$6.25	$7.25	$6.50	$6.25	$8.00	$7.25
Assorted	6.40	7.75	6.50	6.40	8.25	7.50

BAR IRON AND STEEL—Per pound to large buyers at mill, Pittsburgh

Iron bars ..... 3.5c. Steel bars ..... 2.90c.

COAL BIT STEEL—Warehouse price per pound is as follows:

New York	Cincinnati	Birmingham	St. Louis	Denver	Chicago
$0.12	$0.16½	$0.18	$0.19	$0.18½	0.16½

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham	Denver
Solid	16c.	14c.	15c.	16c.
Hollow	24c.	25c.	...	28c.

STEEL AND IRON PIPE—The following discounts are for carload lots f.o.b. Pittsburgh, basing card of Jan. 1 for steel pipe and iron pipe:

Inches	Steel Black Per Cent.	Steel Galvanized Per Cent.	Inches	Iron Black Per Cent.	Iron Galvanized Per Cent.
BUTT WELD					
⅜ to 3	54	40½	⅛ to 1¼	36	20
LAP WELD					
2	47	34½	1½	21	6
2½ to 6	50	37½	1½	28	14
7 to 12	47	33½	2	29	15
13 and 14	37½	..	2½ to 6	31	18
15	35	..	7 to 12	28	15
BUTT WELD, EXTRA STRONG PLAIN ENDS					
⅜ to 1½	52	39½	⅛ to 1½	36	21
2 to 3	53	40½			
LAP WELD, EXTRA STRONG PLAIN ENDS					
2	45	33½	1¼	22	7
2½ to 4	48	36½	1½	28	14
4½ to 6	47	35½	2	30	17
7 to 8	43	29½	2½ to 4	32	20
9 to 12	38	24½	4½ to 6	31	19
			7 to 8	23	11
			9 to 12	18	6

From warehouses at the places named the following discounts hold for steel pipe:

	Black New York	Black Cleveland	Black Chicago
⅜ to 3 in. butt welded	43%	43%	44.9%
3½ to 6 in. lap welded	38%	39%	40.9%

	Galvanized New York	Galvanized Cleveland	Galvanized Chicago
⅜ to 3 in. butt welded	27%	26%	29.9%
3½ to 6 in. lap welded	23%	23%	26.9%

Malleable fittings, Class B and C, from New York stock sell at list plus 15%. Cast iron, standard sizes, 5%.

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Hot pressed square	$0.80	$1.00	$1.25	$1.40	$0.98	$1.05
Hot pressed hexagon	.80	1.00	1.05	1.20	.78	.85
Cold punched square	2.50*	1.00	.75	.75	1.00	1.50
Cold punched hexagon	2.50*	1.00	.75	.75	1.00	1.50

* List plus.

Semifinished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	50–10%	40%
Chicago	50%	60%
Cleveland	50–10%	50%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
½ by 4 in. and smaller	40–10%	40–10%	40%
Larger and longer up to 1 in. by 30 in.	20–5%	20–5%	25—5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:
New York ..... $2.00 Cleveland ..... $1.50 Chicago $1.75
For cast-iron washers the base price per 100 lb. is as follows:
New York ..... $6.00 Cleveland ..... $4.25 Chicago $4.50

CONSTRUCTION MATERIALS

ROOFING MATERIALS—Prices per ton f.o.b. New York and Chicago:

	Carload Lots N. Y.	Carload Lots Chicago	Less Than Carload Lots N. Y.	Less Than Carload Lots Chicago
Tar felt (14 lb. per square of 100 sq.ft.)	$64.00	$57.00	$65.00	$58.00
Tar pitch (in 400-lb. bbl.)	21.00	18.00	22.00	19.00
Asphalt pitch (in barrels)	36.00	36.00	41.50	41.50
Asphalt felt	67.50	67.50	72.00	72.00

PREPARED ROOFINGS—Standard grade rubbered surface, complete with nails and cement, costs per square as follows in New York, St. Louis, Chicago and San Francisco:

	1-Ply c.l.	1-Ply l.c.l.	2-Ply c.l.	2-Ply l.c.l.	3-Ply c.l.	3-Ply l.c.l.
No. 1 grade	$1.35	$1.60	$1.70	$1.95	$2.05	$2.30
No. 2 grade	1.20	1.45	1.50	1.75	1.80	2.05

Asbestos asphalt-saturated felt (14 lb. per square) costs $5.00 per 100 lb.

Slate-surfaced roofing (red and green) in rolls of 108 sq.ft. costs $2.10 per roll in carload lots and $2.35 for smaller quantities.

Shingles, red and green slate finish, cost $5.50 per square in carloads, $5.75 in smaller quantities, in Philadelphia.

HOLLOW TILE—

	4 x 12 x 12	8 x 12 x 12	12 x 12 x 12
St. Paul	$.056	$0.11	$0.162
Cincinnati	.086	.165	.218
Seattle	.09	.175	.30
Los Angeles*	.079	.144	.181
New Orleans	.14	.20	.29

* F.o.b. factory, 4, 8 and 10 inch.

LUMBER—Price per M in carload lots:

	8 x 8-In. x 20 Ft. and Under				12 x 12-In. 20 Ft. and Under	
	Y. P.	Fir	Hemlock	Spruce	Y.P.	Fir
Cincinnati	$42.00	.....	$38.00	$41.00	$37.00	$39.00
Kansas City	39.00	40.50	$40.50	38.50	45.50	42.50
Seattle	19.50	19.50	29.50	19.50	19.50	19.50
New Orleans	45.00	.....	.....	.....	50.00	.....
St. Paul	.....	52.00	48.00	48.00	.....	48.50
Denver	43.00	33.50	.....	.....	48.00	39.00
Los Angeles	*	*	*	*	*	*

	1-In. Rough, 10 In. x 16 Ft. and Under			2-In. T. and G. 10 In. x 16 Ft.	
	Y.P.	Fir	Hemlock	Y.P.	Fir
Cincinnati	.....	$35.00	.....	$40.00	$39.00
Kansas City	$46.00	54.75	$54.75	53.50	60.00
Seattle	19.50	19.50	19.50	19.50	19.50
New Orleans	52.00	.....	.....	60.00	.....
St. Paul	62.50	48.00	43.00	.....	48.50
Denver	43.25	32.50	32.50	35.00	31.00
Los Angeles	39.00	33.00	34.00	*	*

* Los Angeles: Base price of fir is $32; of hemlock, $34; redwood, $35.

NAILS—The following quotations are per keg from warehouse:

	Mill Pittsburgh	St. Louis	Dallas	Chicago	San Francisco
Wire	$3.50	$4.37	$4.75	$4.32	$5.35
Cut	4.00	6.50	....	6.50	6.75

PORTLAND CEMENT—These prices are for barrels in carload lots, including bags:

	Current	One Month Ago	One Year Ago
New York	$3.45	$4.00	$2.22
Jersey City	3.62	3.62	2.16
Boston	3.67	3.67	2.37
Chicago	3.05	3.05	2.21
Pittsburgh	3.15	3.15	2.31
Cleveland	3.32	3.32	2.44
Denver	3.67	3.67	3.20

Note—Bag refund is generally 25c. each; exceptions being, Cincinnati, 9c.; Dallas, 10c.; San Francisco, 15c.

LIME—Warehouse prices:

	Hydrated per Ton		Lump per 300-Lb. Barrel	
	Finished	Common	Finished	Common
New York	$17.50	$14.50	$2.90	$2.65
Chicago	18.00	17.50	1.80*	1.10*
St. Louis	22.00	16.00	.....	1.75*
Boston	22.20	18.20	3.65	3.35
Dallas	16.50	.....	.....	2.50
San Francisco	20.00	.....	.....	2.40
St. Paul	25.00	19.00	1.97*	1.93*
New Orleans	19.74	16.45	19.47‡	19.27‡
Cincinnati	14.20	11.95	.....	.....
Denver	.....	26.25‡	.....	2.50*
Los Angeles	.....	.....	3.00	2.30†

* 200-lb. barrels. † Per 180-lb. bbl. ‡ Per ton.
Note—Refund of 10c. per barrel.

LINSEED OIL—These prices are per gallon:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Raw per barrel	$1.49	$1.28	$1.90	$1.30	$1.66	$1.26
5-gal. cans	1.74	1.38	2.00	1.40	1.86	1.35

WHITE AND RED LEADS in 500-lb. lots sell as follows in cents per pound:

	Red				White			
	Current		1 Year Ago		Current		1 Yr. Ago	
	Dry	In Oil	Dry	In Oil	Dry and In Oil		Dry and In Oil	
100-lb. keg	13.00	14.50	12.25	12.50	13.00		12.50	
25- and 50-lb. kegs	13.25	14.75	12.50	12.75	13.25		12.75	
12½-lb. keg	13.50	15.00	12.75	13.00	13.50		13.00	
5-lb. cans	.....	.....	14 25	14.00	15.00		14.50	
1-lb. cans	.....	.....	14.25	14.50	16.00		14.50	

MINING AND MILLING SUPPLIES

HOSE—

Fire

	50-Ft. Lengths
Underwriters' 2½-in.	80c. per ft.
Common, 2½-in.	30%

Air

	First Grade	Second Grade	Third Grade
¾-in. per ft.	$0.55	$0.40	$0.30

Steam—Discounts from List

First grade..... 25% Second grade.....35% Third grade.....40%

LEATHER BELTING—Present discounts from list in the following cities are as follows:

	Medium Grade	Heavy Grade
New York	40–5%	35%
St. Louis	45%	50%
Chicago	45%	40+5%
Birmingham	30%	35%
Denver	35–5%	30%
Cincinnati	40—10%	40%

RAWHIDE LACING—50c. for cut; 45c. per sq.ft. for ordinary.

MANILA ROPE—For rope smaller than ½-in. the price is ½ to 2c. extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: ½-in., 8 ft., ¾-in., 6; ¾-in., 4½; 1-in., 3½; 1¼-in., 2 ft. 10 in.; 1½-in., 2 ft. 4 in. Following is price per pound for ½-in. and larger, in 1200-ft. coils:

Boston	$0.24	Denver	$0.22
New York	.23	Kansas City	.23½
Cincinnati	.24	New Orleans	.22½
Chicago	.21½	Los Angeles	.25
St. Paul	.23	Seattle	.24
San Francisco	.22	St. Louis	.21½

PACKING—Prices per pound:

Rubber and duck for low-pressure steam	$0.95
Asbestos for high-pressure steam	1.60
Duck and rubber for piston packing	1.00
Flax, regular	1.20
Flax, waterproofed	1.60
Compressed asbestos sheet	1.00
Wire insertion asbestos sheet	1.20
Rubber sheet	.60
Rubber sheet, wire insertion	.80
Rubber sheet, duck insertion	.50
Rubber sheet, cloth insertion	.30
Asbestos packing, twisted or braided and graphited, for valve steme and stuffing boxes	1.20
Asbestos wick, ¼- and 1-lb. balls	.85

REFRACTORIES—Following prices are f. o. b. works, Pittsburgh:

Chrome brick	net ton	$120.00	at Chester, Penn.
Chrome cement	net ton	65.00	at Chester, Penn.
Clay brick, 1st quality fireclay	net ton	40–30	at Clearfield, Penn.
Clay brick, 2nd quality	net ton	38–48	at Clearfield, Penn.
Magnesite, dead burned	net ton	37.50	at Chewalah, Penn.
Magnesite brick, 9 x 4½ x 2½ in.	net ton	90.00	at Chester, Penn.
Silica brick	net ton	45–55	at Mt. Union, Penn.

Standard size fire brick, 9 x 4½ x 2½ in. The second quality is $4 to $5 cheaper per 1000.
St. Louis—Fire Clay, $35 to $50.
Birmingham—Fire clay, $40–$45; silica, $40–$50; magnesite, $90; chrome, $120.
Chicago—Second quality, $25 per ton.

RAILWAY TIES—For fair size orders, the following prices per tie hold:

	Material	7 In. x 9 In. by 8 Ft.	6 In. x 8 In. by 8 Ft.
Chicago	Plain	1.48	1.33
San Francisco	Douglas Fir—Green	1.35	.96
San Francisco	Douglas Fir—Creosoted	2.70	1.92

Prices per tie at Missouri mills; St. Louis prices about 25c. higher:

Untreated A Grade White Oak 6x8x8		Untreated A Grade Red Oak 6x8x8	
No. 1	$0.70	No. 1	$0.55
No. 2	.80	No. 2	.65
No. 3	.90	No. 3	.75
No. 4	.98		
7x9x8 white oak			1.05
7x9x8 red oak, No. 4	.80	No. 5	.87

FLOTATION OILS—Prices of oils for flotation, in cents per gallon, in barrels:

	New York	Chicago In Bbl.	Carloads	Denver In Bbl. Lots
Pure steam-distilled pine oil, sp. gr. 0.925-0.94	$0.58	$0.72	$0.67	$0.81
Pure destructively distilled pine oil	.58	.64	.61	.55–.65
Pine tar oil, sp. gr. 1.02 = 1.035	.35	.56	.51	.60
Crude turpentine	.45	.70	.65	.60–.65
*Hardwood creosote, sp. gr. 0.96-0.99	.23	.62	.59	.42–.45

* F.o.b. Cadillac, Mich.

COTTON WASTE—The following prices are in cents per pound:

	New York		Cleveland	Chicago
	Current	One Year Ago		
White	11.00 to 13.00	13.00	16.50	12.00 to 16.50
Colored mixed	8.50 to 12.00	10.00	13.00	11.50 to 14.00

WIPING CLOTHS—Jobbers' price per 1000 is as follows:

	13½ x 13½	13½ x 20½
Cleveland	$52.00	$58.00
Chicago	48.00	50.00

EXPLOSIVES—Price per pound of dynamite in small lots and price per 25 lb. keg for black powder:

	Low Freezing 20%	Gelatin 40%	Gelatin 60%	80%	Black Powder
New York	.....	$0.29½	$0.34½	.....	$2.40
Boston	$0.23½	.26½	.31½	$0.35½	2.65
Cincinnati	.18½	.22½	.26½	.....	2.35
Kansas City	.20½	.25½	.30½	.38½	2.45
New Orleans	.20½	.24½	.28½	.....	2.60
Seattle	.....	.25½	.32½	.....	.....
Chicago	.18½	.22½	.30	.36	2.35
St. Paul	.19	.24½	.30½	.....	2.45
St. Louis	.19	.25½	.30½	.36½	.....
Denver	.17½	.24	.29	.35	2.45
Dallas	.21	.25	.29	.39	.....
Los Angeles	.23	.29	.37	.....	2.95

CHEMICALS

SODIUM CYANIDE—New York price is 30c. per lb.; Denver, 42c.; Chicago, 31½c.; St. Louis, 31c.

SODIUM SULPHIDE—In New York the price per pound is 8½c. for concentrated, 4½c. for crystals. The St. Louis price is 10c. for concentrated, 20c. for fused; the Chicago price is 6c. for concentrated, 4½c. for crystals. Concentrated comes in 500-lb. drums, the crystals in 440-lb. bbl.

ZINC DUST—For 350 mesh the New York price is 14c. per lb.; Chicago 15½c.; Denver, 13½c. f.o.b. Pueblo; St. Louis, 13c.

ALUMINUM DUST—Chicago price is $1.30 per lb.

MINERS' LAMP CARBIDE—Prices net f.o.b. cars at warehouse points.

	Union 100-Lb. Drums Per Ton	Cameo 100-Lb. Drums Per Ton	Union 25-Lb. Drum Per Drum
East of the Mississippi, North of Chattanooga	$106.00	$101.00	$1.52
Southeastern portion U. S. A.	115.50	110.50	1.63
Texas (except El Paso)	124.00	119.00	1.74
El Paso, Texas	126.00	121.00	1.77
Denver, Colo.	124.00	119.00	1.74
West Coast	129.00	124.00	1.81